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“PHOTOGRAPHY — UP TO DATE.”

A COLLECTION OF THE “VERY LATEST” HINTS
RECEIPTS, DODGES, FREAKS, PROCESSES,
EXPERIMENTS, ETC.

IN CONNECTION WITH THE ART AND ITS
APPLICATIONS

WITH
PRACTICAL INSTRUCTIONS FOR BEGINNERS.

BY
W. INGLES ROGERS,

Author of “Photographic Gems.”

— ONE SHILLING. —

PUBLISHED BY THE AUTHOR.

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PREFACE.

BUILDING upon the success of a former publication of mine ("Photographic Gems,") I have endeavoured to give in the following pages an unique compendium of information suited to Photographers of all classes and grades, from the camera-struck novice to the enthusiastic scientist, being the gist of all that has been written, said, or done in the furtherance of our delightful art during the past quarter century.

The intention of the book is to tell you all you want to know, *and no more*—to give the greatest information in the fewest words; and to form a series of stepping-stones to success for the struggling beginner, and an aid to memory for the experienced practitioner.

It contains the *very latest* hints and processes up to the moment of going to press, and is divided into sections in order that any particular paragraph may be readily found.

Should any difficulty be experienced in carrying out any of the instructions given, I shall be happy at any time to enter into correspondence with anyone on the subject and to impart the information they require.

W. INGLES ROGERS.

St. Germans, Cornwall,
March 1st, 1892.

PHOTOGRAPHY UP TO DATE."

PART I.

The Art and how to acquire it.

PHOTOGRAPHY may be made a costly pastime or a remunerative one; it all depends on how you are going to work it. If you are an amateur and want to work it for love, there is plenty of pleasure to be got out of it. But if you want to be a professional and work it for profit,—well, its going to cost you something. But that's neither here nor there, nor anywhere else for that matter. You want to learn Photography, and I am going to tell you how to do it with the least trouble, and with the least expense, and in the shortest time. And now having given you all the theory I am going to, we will lay that on the shelf, and get to business.

It is highly probable that, before investing in this little book, you have already purchased your kit, and if so, these opening remarks will be of little interest to you; but if you are really and truly a beginner, and your stock of photographic apparatus as yet exists only in the imagination, it will be advantageous to you to know what to buy and how to buy it.

Now were it possible for me to look down into your pocket, and see the exact state of your finances, it would be an easy matter for me to advise you as to the mode of expenditure; for though it is possible to take a photograph by simply pricking a hole in the crown of a stove-pipe hat, sticking a dry plate behind it, and stopping up the remaining space with a pocket-handker-

chief, yet it is a fact that £100 may be spent in the purchase of photographic appliances and still find room for more. Presuming, however, that you are neither a pauper nor a millionaire, I will glance over my pile of catalogues, and see what a couple of guineas will do in the way of giving you a start. One piece of advice —*don't* begin with a hand-camera! If you do, you'll soon finish with it, and with photography altogether. Such luxuries have to be attained. Don't take a leap in the dark, but *feel your way*.

Here is a list of the articles you will require, and I should advise you to make a copy of it, and take to a reputable dealer, who will doubtless be able to meet your requirements.

		£	s.	d.
Lancaster's guinea $\frac{1}{4}$ -plate set	...	...	1	0
Ruby lamp	...	0	2	6
3 $\frac{1}{4}$ -plate porcelain dishes	...	0	1	6
$\frac{1}{4}$ -plate printing frame	...	0	0	8
Set of scales and weights	...	0	2	0
2 oz. graduated measure	...	0	0	6
Draining and drying rack	...	0	1	6
Camel hair dusting brush	...	0	0	4
$\frac{1}{4}$ -plate cutting shape	...	0	0	6
1 dozen Ilford $\frac{1}{4}$ -plates ..	...	0	1	0
1 oz. pyrogallic acid	...	0	1	0
1 oz. bromide of ammonium	...	0	0	3
1 oz. citric acid ...	...	0	0	3
1 lb. powdered alum	...	0	0	3
$\frac{1}{2}$ oz. bichloride of mercury	...	0	0	2
$\frac{1}{2}$ oz. sal ammoniac	...	0	0	1
1 oz. liquor ammonia 880°	...	0	0	2
1 oz. borax	...	0	0	1
3 sheets sensitized paper	...	0	2	3
1 tube chloride of gold ...	...	0	2	0
1 lb. hyposulphite of soda	...	0	0	3
100 $\frac{1}{4}$ -plate mounts	...	0	1	6
$\frac{1}{2}$ pint negative varnish...	...	0	1	0
1 yd. black twill	...	0	0	9
Trimming knife	...	0	0	6
		<hr/>	<hr/>	<hr/>
		£2	2	0

This is all you will require at present, and is sufficient to set you on the first rung of the ladder of proficiency.

As I proceed, however, I shall mention sundry other articles which you will require for carrying out the various processes and variations of the art, but they are unnecessary at first. It is my object to make your first steps simple and easy, so that when you have laid the foundation of your success, you will be able to branch off into the various ramifications with safety and assurance.

Now we will get to work and see what we can do with the articles above mentioned. Assuming that you have managed in some way to beg, borrow, or steal a room (or closet) in which you may carry on the necessary operations, we will enter it and make the required arrangements for our campaign.

In the first place, a bench or table must be provided on which to rest the developing-trays and other accessories for developing. Beneath this should be arranged some kind of a sink or trough (a bucket will do) into which we can pour our waste solutions.

A small bracket must now be fixed for the purpose of holding the ruby lamp, and above this a long shelf on which to arrange the various bottles containing the solutions we shall require to use.

The carpentry portion of our work over, we will at once proceed to make up the said solutions, as it is deleterious to the chemicals and dangerous to the user to allow them to lay about in packets.

Now let us go through our list—

Pyrogallic Acid.	{ This may be used dry, and should stand in original bottle.
Bromide of Ammonium.	{ Dissolve this in as little water as possible, and label "Bromide."
Citric Acid.	{ Add to this two ounces of the powdered alum and dissolve in ten ounces water. Label it "Clearing solution."
Bichloride of Mercury.	{ Place this and the sal ammoniac together and mix with twelve ounces water. N.B.—This is a virulent poison, and should be

handled with extreme care. It should be kept in a safe place, and labelled "Intensifier—Poison!"

Liquor Ammonia.

Chloride of Gold.

Hyposulphite of Soda.

Negative Varnish.

Keep in glass-stopped bottle.

Put in a clean basin fifteen drams water and drop in it the tube containing this expensive chemical. A smart blow with the handle of a knife will break it. When the contents are dissolved, strain into a bottle, and label "Gold solution."

Place into a jar and pour upon it two quarts of water. This is the "Fixing solution."

Keep well-corked in the original bottle.

We have now disposed of everything but the sensitized paper and the mounts, which should be placed safely away in a drawer till required.

The next item on our programme, and a most important one, is to make our room perfectly dark. In no case must the box of plates be touched till this is done. Every crack and slit must be scrupulously covered, for the darkness must be such as can be felt. Then, and not until then, can we light our ruby lamp, and commence operations. Take the dark slide, which will be found included with the set, and after opening it, dust it thoroughly, and lay it open upon the table. Now open the plate box, and take therefrom two of the sensitive plates, dust each carefully, and place in the slides, one face down and the other face up, with the black card-board partition between. (If any difficulty is experienced in discerning which is the proper side, simply hold the plate to the light, and look at it obliquely—the side showing the *least* reflection is the one bearing the film.)

Our dark slide being now charged, *and the plate-box securely covered*, we may once more open the door of our laboratory, and taking up camera, tripod, and cloth, sally forth in search of a victim.

Inanimate objects, however, are best for first attempts, as they will not be likely to discourage you by sarcastic remarks, and you will have no difficulty in getting them to remain still while you operate.

We will suppose you have selected a house (presumably your own)—the first thing to do is to get it in focus.

Focussing.

After setting up your camera, you find that on applying your eye to the ground-glass, nothing will be seen. But throwing the focussing-cloth over your head, a more or less distinct image of whatever happens to face the lens will be perceived. By moving the lens forwards or backwards by means of the focussing screw, it will be found possible to greatly increase the distinctness of the image, and this operation is known as focussing.

Having got the picture (which, of course, is inverted) fixed sharply on the focussing-screen, you have now to transfer it to the plate contained within the dark slide. To do this, you remove the screen, and without shifting the camera, insert the slide in its place. Then place the cap on the lens, draw out the shutter of the slide, and throw the black cloth loosely over all. Now comes an important point, the

Exposure.

Volumes have been written in one way and another on this exclusive subject, and many and varied are the tables that have been compiled for the purpose of determining the amount of time necessary for the successful transference of the image to the sensitive film of the plate.

But for my own part, I abjure them all. Experience is a better teacher than books, and the sooner you learn to trust chiefly to experience the better it will be for you and your work.

Supposing you have chosen a bright sunny day for your first experiment, all that is necessary is to remove the cap from the lens, *without shaking the camera*, and replace it as quickly as possible. Nothing can be easier. Now close the shutter, remove the slide, and return to your dark-room to ascertain the result.

Of course, when the weather is dull and gloomy, the object badly lighted, or the day very much advanced, resource must be had to counting.

At such times as these, the following simple table will be found handy as a basis for calculation.

Sea and Sky.	Open Landscape.	Landscape with heavy foliage in fore-ground.	Under trees, up to
Mins. Secs.	Mins. Secs.	Mins. Secs.	Mins. Secs.
$\frac{1}{10}$ sec.	$\frac{1}{3}$ sec.	2 secs.	2 40
Fairly lighted Interiors.	Badly lighted Interiors, up to	Portraits in diffused light out of doors.	Portraits in ordinary room.
Mins. Secs.	Hours. Mins.	Hours. Mins.	Mins. Secs.
2 40	0 32	2 $\frac{2}{3}$ secs.	1 4

The image we have thrown on the sensitive plate is not as yet visible, and we have to render it so by the process of

Developing.

There are various methods of doing this, and the simplest is as follows :—

Arrange your three dishes in a row. In the first put clean water, in the third some of the hyposulphite solution, and in the middle dish put the following mixture. Procure some common washing soda, and after weighing out an ounce, dissolve it in ten ounces water. Now measure out an ounce of this solution in your graduated measure, and drop into it two grains of the dry pyrogallic acid, and two drops of "bromide."

This is the developer. After making your room dark, remove the exposed plate from the slide, and place it into No. 1 dish for a few seconds, after which transfer it to dish No. 2. Rock the dish gently, and after a minute or so, the picture will appear. Keep rocking till every detail is visible and the plate shows a fair amount of density by looking through it towards the light. When this stage is reached, rinse the plate carefully in No. 1 dish and remove it to No. 3. In a few minutes the white film that shows on the back of the

plate will disappear, and the plate is then fixed. You may now open the door of your laboratory and examine the negative (for such it must now be called) by white light.

If it has been correctly exposed and developed a beautifully clear picture will be the result, having the lights and shades reversed—that is to say, the light portions, such as the sky, etc., will be opaque, while the dark portions representing the shadows or the foliage, etc., will be transparent.

It will be found, however, that a thin yellow veiling will partially obscure the transparent parts, and in order to remove this you soak the negative for a minute or so in a little of the clean solution, after which it is transferred to a dish of clean water for the purpose of soaking out the excess of hyposulphite, which having performed its legitimate function, would prove detrimental to the negative if allowed to remain. The water in this dish must be changed frequently (say at intervals of half-an-hour for about six hours) and the negative placed in the drying rack to dry.

If this be done immediately before retiring, the next morning will find the plate ready for

Varnishing.

This process, though not absolutely necessary, is nevertheless advisable as a protection from mechanical injury or the deleterious effects of the atmosphere. Hold the negative firmly between the finger and thumb of your left hand and pour upon it a little of the negative varnish from the bottle. Slant the plate in each direction alternately, so as to allow the varnish to run to the four corners, holding the last corner over the mouth of the bottle and letting the surplus varnish drop into it.

Now place the negative on the shelf *horizontally*, carefully guarded against dust, and leave to dry.

Printing.

Our operations hitherto have been confined to the production of the negative, and we must now turn our attention to the second branch of the art—that of

printing from it. The sensitized paper which we receive in sheets, has first to be cut to the required size, and the quickest and most economical way of doing this is to fold the sheets as near as possible to the size of our negative, and then trim the edges by means of the knife and cutting shape.

This should be done in a weak light, (preferably by lamplight) as the paper, though not so sensitive as the plates, rapidly discolours if too strong a light is used. This being done, take the printing frame, and lay the negative in it with the film side uppermost. Dust it well, and place upon it a piece of the prepared paper, backing it up with the felt-covered board, and securing the whole by means of the springs. It must now be taken out into the light (a diffused light is best) and allowed to remain till the image is fully delineated, which may be ascertained by lifting one half of the hinged back. When the picture is *a trifle darker* than it should look when finished, remove it, and insert a fresh sheet, placing the printed piece away in a box for safety. When you have obtained as many copies as you require, then comes the operation known as

Toning.

Having procured an earthenware pan, fill it with clean spring water, and immerse the prints one by one. After about a quarter of an hour, remove them carefully into another pan, also filled with water, and throw away the contents of the first, which will be found to be somewhat milky. Repeat this several times till no trace of milkiness remains, and then cover while you prepare the following solution.

Presuming that you have a dozen prints to tone (it is always best to do as large a quantity as possible at one time), you will require to weigh out forty-five grains of the borax, and dissolve in eight ounces water, to which add half dram of gold solution.

This is the toning bath. Take the prints singly from the washing water and place face downwards in the solution, keeping them in motion so as to prevent their sticking together.

In a very short time they will turn from red to purple, but the tone may be regulated according to taste. When the desired tint is obtained, return them to the water, cover, and place the toning bath away for future use. This bath may be used over and over again by adding fresh gold solution each time, at the rate of half dram to every dozen quarter-plate prints.

Now take half pint of your fixing solution and place the toned prints in it, keeping them in motion as before. Ten minutes usually suffices for the fixing, after which they have to undergo a process of washing similiar to that of the plates, in order to get rid of the free hypo., when they are placed in a clean blotting-book to dry.

Mounting.

This, the last of your operations, is perhaps the most particular, and requires the greatest care, for it is possible, notwithstanding the pains you have taken to bring the picture to its present stage, by carelessness in this final process, to ruin all. Cleanliness is the first essential for successful mounting. Everything used should be of the cleanest and purest, and the operation conducted in a room where the least dust is present.

As a mountant, nothing is better, cleaner, or easier prepared than starch. Put a teaspoonful into a cup and make into a stiff paste with cold water; then pour boiling water upon it, stirring all the time, till the starch suddenly becomes thick. It should be used cold.

The prints, when dry, should be laid together in a pile face down on a sheet of clean paper, and the starch applied to the topmost one with a camel's hair brush. Having placed the print on the mount in the proper position, a small ebony or glass roller should be passed over it, commencing at the centre, and rolling towards the edges, by which it will become smoothly and securely attached to the mount. Wash off the surplus starch with a clean damp sponge, and set aside to dry. When the whole of the prints are mounted, and *surface* dry, they should be placed under pressure for an hour or so, or better still, taken to a professional photographer, who will for a trifling sum produce a high gloss on them by means of his burnisher.

In writing out these instructions, I have taken it for granted that each operation has been successfully performed, as it should be if the instructions are faithfully followed.

I have limited myself to the smallest size, and the simplest process, which is best suited to the beginner. He will find, however, that the *modus operandi* will hold good for any size, and when he has arrived at that stage of proficiency as to be desirous of extending his knowledge of the art by dipping into the more complicated processes and adaptations, he will find the information he requires among the contents of the following pages.



PART II.

Field Hints.

Choosing a Camera.

IN choosing a camera, always pick the square bellows, as they are more useful for all-round work than the conical. Every camera should possess a swing back reversing frame, and sliding front; also a hinged focussing screen and baseboard, folding up to protect the ground glass.

To Detect Pinholes.

At frequent intervals the bellows of the camera should be examined for pinholes or weak spots through which light may enter. Cover the head with the focussing cloth, and having lifted up the focussing screen, wait two or three minutes to allow the eyes to become accustomed to the darkness, and then get one of your sisters, your cousins, or your aunts to move a lighted candle all round the bellows, and watch for leaky places.

When found, glue a small piece of linen over the hole, and when dry give it a thick coat or two of dead black varnish. Occasionally paint over the whole of the inside of the camera and the dark slides with this, so as to make certain more sure. After the enforced rest of winter, examine carefully for mildew, as this is said to fog any plate.

To Utilize a Lens to best advantage.

Those who only possess one lens can always unscrew one of the combinations, and use the other or

both as single landscape lenses. As a rule the front lens should be screwed into the position of the back lens, thus presenting its concave surface to the view or object to be photographed. By this division of the lens one obtains two single lenses of about double the focus of the doublet.

The back lens or combination, as it is called, may be removed, and the front left in its place, and in this position, if not too large a plate be used, it will enable one to employ a larger aperture than the other way.

To Measure the Aperture of a Lens.

To measure the aperture or width of a lens unscrew one of the combinations, if it be a doublet, and measure the diameter of the same on the concave side by laying a flat inch rule across it ; this divided into the equivalent focus will give the angular aperture.

To find the Depth of an Unmounted Lens.

Make a paper or cardboard tube of the same diameter (inside) as your lens, and about half as long again, and blacken it inside. The lens should be fixed in one end by means of narrow strips of thin cork, glued on inside, and then the tube be wrapped with soft, thick blotting paper until it will fit a flange in your camera front. Black cardboard stops may be made to fit the other end of the tube, and the image can then be studied on the ground-glass with any aperture you wish.

To Preserve Lenses.

It will preserve your lens if you have an extra cap for it to put over the back ; this is specially useful as a protection when out in the field.

Shading the Lens.

Shading the lens is a matter of some importance at all times, and of special importance when the light is intense. A glare on the surface of the glasses illuminates rough particles of dust and degrades the image, while reflections from the lower part of the mount—

when it projects—may do more definite harm. A piece of black cardboard, which can be so placed as to project over the front of the camera a few inches beyond the lens is a real advantage, and in few cameras is there no means of holding this. Two discs of card half-an-inch in diameter, and held on the top of the camera by a screw each will serve, if the shading strip is cut of such a width that it just slides under these discs and between the stems of the screws; or two strips of spring brass may be used.

To Find the Focus of a Lens.

Take a foot-rule, tack it up in a good light level with the lens in the camera. Adjust the camera so that when the rule is in sharp focus it will measure exactly three inches on the screen; then measure the exact distance between the rule and the ground-glass. Multiply this distance (the number of inches) by four, and then divide by twenty-five. The quotient is the focal length of the lens in inches.

The Proper Use of Stops.

There are many who do not correctly comprehend why a lens has a number of stops, nor do they know why one should be used more than another. Let the camera be placed so that the houses opposite are in focus, then change the stops from large down to small, and note the effect on the ground-glass, not only as regards the brilliancy of image, but also the influence of stops on the definition towards edges and corners; the visual brilliancy decreases as the definition increases, but the brilliancy of a negative will, with a proper exposure, be maintained, and the sharpness improved, as we reduce the stop, within certain limits. It has recently been shown that it is possible to injure the definition by using too small a stop.

To Prevent the Bellows from cutting off the View.

Cut from a piece of thin board a disc of such size

as your requirements necessitate. In the centre of this cut an aperture of slightly greater diameter than that of the back of your lens (to correspond, when in position, with that in the front board of camera). Glue two small slips across grain to prevent warping. Blacken all over, and screw, *inside camera*, to the inner side of front board. You can regulate the size of your piece to engage and remain securely held between it and front board any number of folds of the front end of your bellows, thus obliging the back portion to come into action when focussing, and leaving nothing to cut off rays from your plate. This contrivance, while it is thoroughly effectual, has the merit of being hidden from view, does not spoil the appearance of your camera, and can be applied or removed in a very short time.

Home-Made Focussing Screens.

Unfortunately, glass is not quite so strong as cast iron, consequently it is by no means unusual to find that it may be accidentally broken ; or again, the grain of the glass may be so coarse as to interfere with the ease of focussing. A few hints then as to home-made screens may be acceptable. Coarse grain may be improved by laying the glass on some soft, firm support, sprinkling with fine emery and water, and rubbing as evenly as possible with another sheet of glass ; or a fine Water of Ayr stone well oiled may be used, or the ground glass may be oiled, the only objection to this being that it attracts every particle of dust flying about. A far preferable plan is by using albumen or the white of egg beaten up to a froth and allowed to settle for twenty-four hours, and then diluted with water and flowed over the ground glass and set up to drain and dry ; the more the albumen is diluted, the more distinct the grain. Ordinary negative varnish flowed over the ground glass makes it more transparent ; the ground glass may also be replaced entirely by plain glass coated with matt varnish, which may be made according to the following formula :—

Sandarac	...	...	...	...	$\frac{1}{2}$ oz.
Mastic	...	...	...	...	$\frac{1}{2}$ "
Ether	...	...	...	...	8 "
Dissolve and filter, and add—					
Rectified benzole from		...	...	1—2	"

The more benzole is added the coarser the grain, therefore it is advisable to add this gradually, and after each addition to test it by flowing on to a glass plate and allowing to dry.

A Temporary Screen.

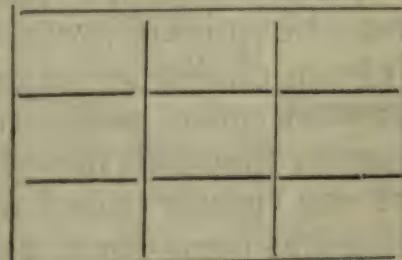
When a focussing screen has been broken, a temporary makeshift may be found in a sheet of glass dabbed over with putty or a piece of dough. Or a sheet of tissue paper, parchment, or parchment paper, or even a thin cambric handkerchief, wetted, may be used.

Focussing Screen too Dense or too Transparent.

In the former case, make the glass warm, rub over with a piece of wax, and polish off with a soft cloth. In the latter, rub with a piece of chalk, and wipe off the excess.

To Mark Focussing Screen.

Mark your screen with pencil as diagram, dividing ground glass into three equal parts each way with the lines. The strong points artistically of the picture are where the lines cross. Place your principal figures or objects as near one of these as practicable, and by way of balance arrange to have a secondary object of less importance where the opposite lines cross. Do not divide the picture into halves by the sky-line, but let it be at or near one of the lines on the screen.



Flexible Paint for Backgrounds.

The following retains sufficient flexibility to enable the sheet to be rolled :—

Soft Soap	...	...	...	2 ozs.
Boiling water	...	...	...	12 "

Dissolve and work well into usual oil paint ; 6 lbs.

Another Background Paint.

Take Starch	...	...	...	...	4 ozs.
Water	...	...	...	...	12 "

Boil the above well till it thickens. Then with a stiff brush cover the calico which has been stretched upon a frame, the corners braced with cross pieces to keep the frame in proper shape. After the starch has been applied, the following makes an excellent colouring—

Common Whiting	...	...	15 ozs.
Powdered Glue	...	...	5 "
Treacle	...	...	8 "
Water	...	...	3 qts.

When thoroughly mixed add—

Lampblack	...	...	...	1 $\frac{1}{2}$ ozs.
Ultramarine	...	...	...	$\frac{3}{4}$ "
Venetian red	...	...	...	$\frac{3}{4}$ "

Put on the fire until hot, and brush over the calico carefully with a broad flat brush.

Shaded Background.

Here is a simple plan by which a shaded background may be quickly produced :—Take colour in fine powder, (cheap chalks or pastels rubbed up in a mortar will answer quite well), and sprinkle it on to the brown paper, then rub it well in, where required, with a piece of rag tightly rolled up and used as a stump. When this has been done, the superfluous pigment, *i.e.*, that which has not been subjected to the friction, is dusted off. This is a very expeditious method of producing a graduated background when one may be urgently required for a special purpose.

Artificial Background.

It is not necessary when a portrait is produced in the studio with a scenic background that the latter should be a painted one, for it may be introduced by a second printing from a negative direct from nature. The following simple method is well adapted to the purpose. The portrait negative is taken in the studio with a white—or rather, a very light—background, so that when it is printed the figure appears on a plain and slightly toned paper. The figure is then painted over with some non-actinic water colour—gamboge, for example—so as to protect it from light in the second printing. When the colour is dry, the print is exposed behind the landscape negative, care being taken that it is not deeply printed. In washing the prints prior to toning the colour is removed, leaving the paper perfectly clean. It may be explained that the view negative should be of a very weak and delicate character, otherwise the background will appear obtrusive, and thus spoil the artistic effect. The slight tone which the background has before the landscape is printed softens the effect, and gives atmosphere to the picture. A variety of these thin negatives of local scenery could easily be produced and kept in stock ready for use as required. If this were done, sitters could make a selection of the views they preferred as backgrounds for their portraits. Photographers would also be saved the trouble or expense of making the painted backgrounds.

Plain Background.

Plain backgrounds are best on the whole. To make them at home, take good strong unbleached calico; strain it over a wooden frame about 6ft. x 7ft., tacking corners down first, then sides, taking care that all is tight and free from puckers. Then *prime* the calico with a coating of thin glue, laid on hot and evenly. Set the frame on one side to dry. Meantime mix your colour thus:—Take two balls of ordinary household whitening, place them in a pail with sufficient water to make the solution like viscid mud. Stir with a wooden spoon

until perfectly free from lumps. Add the colour (lamp black or burnt umber ground in water, or a mixture of each, according to taste) little by little, mixing the mass thoroughly with spoon to obtain an even colour. This is always darker when wet than when dry, so that allowance must be made for this. By making test coatings on a small piece of paper, artificially dried, it is easy to ascertain when correct shade is arrived at. When this is reached, add $\frac{1}{2}$ -lb. patent size, previously melted on the fire in a pint of hot water. Stir together thoroughly until perfectly even in consistency and colour. Allow to thoroughly cool. Lay it on the back-ground with a broad flat brush, first vertically, then horizontally, covering only a couple of square feet at a time. Effects of light and shade can be added by addition of colour from time to time, as the work progresses, and as experience teaches.

Backgrounds for Winter Portraits.

Suitable backgrounds and accessories can, with a little ingenuity, easily be extemporised. With a small sash tool and a little whitewash, any old or damaged sunny landscape background can quickly be converted into a snow-clad scene. If the background be a good one that is utilised, provided it be in flatted oil, it can at any time be restored to its original condition with a sponge and water. With regard to the accessories, two or three pounds of cotton wool judiciously distributed on the horizontal parts of the ordinary out-door ones will be all that is necessary, while a few sheets of common wadding for the floor will complete a very effective winter scene for the studio.

Umbrella Changing Bag.

You can easily make a changing bag from an old umbrella. With a little alteration it makes a developing tent at a pinch, yet packs up with the camera stand. To make the changing bag, take four pieces of cardboard, 18 x 9 ins., make them into a box, minus ends, by glueing stout strips of linen on the edges, on *both*

sides, not allowing the card sides to meet by $\frac{1}{4}$ -in., so that this frame can fold up flat; then take black linen 1 yd. 2 ins. square, glue this over the frame, put a runner of elastic at either end of the surplus linen, and it is ready. You have only to pass in the dark back and plates, slip the hands in through the elastics, slipping them well up the arms, and it will be quite light-proof.

To Measure Stops.

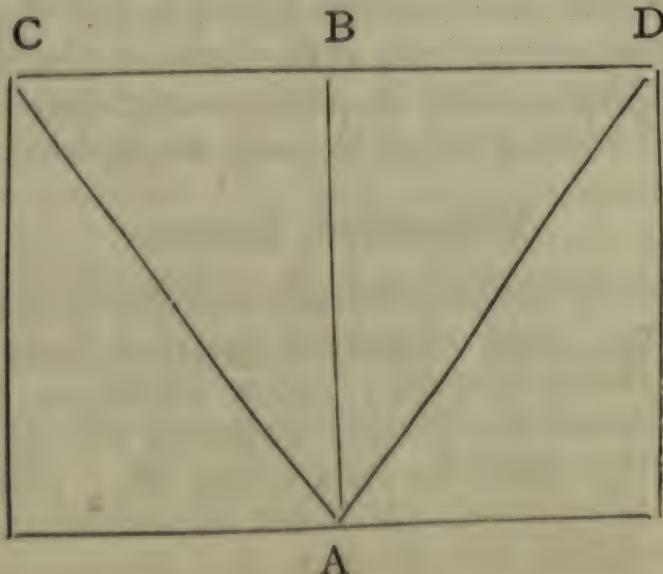
Cut a wedge-shaped piece of thin cardboard and push this through the circular opening of the stops as far as it will go. Mark this point on the card with a pencil, withdraw the cardboard, and measure its width at the pencil-mark; this will be the true diameter of the stop.

To Blacken Stops.

Heat the stops in a smokeless flame (spirit or Bunsen), dip in solution of copper nitrate, and heat again until proper colour comes, then let cool and wipe over with an oily cloth.

A Simple Finder.

A simple finder is made by turning up the focussing screen on to the top of the camera, and drawing on it three lines, as shown below. When using this, the eye is placed at A, and looking along A B will give us the centre of the plate, whilst C A D is the angle included by the lens or the amount of subject included on the plate.



Another.

Obtain a wooden box $1\frac{1}{2}$ in. cube or thereabouts. Cut a circular hole in one end, in which fix a concave lens. At an angle of forty-five degrees place a bit of looking-glass, and cut an oblong hole in top. Place on top of camera, and look down.

Another.

A short focus spectacle lens, a sloping mirror, and a bit of ground glass will make a good finder.

A Focussing Dodge.

Ask your wife or a lady friend for four dress weights, and sew them in the corners of your focussing cloth, and you won't be bothered by its blowing in all directions on a windy day.

To Prevent Lens Dew.

Unless one has a habit of *always* looking on the front of the lens while exposing, he is very apt to be misled while developing a plate which is foggy, and blame the maker. While in the country this summer, I tried a few landscapes, and by chance, looking on the front lens while exposing, I saw it covered with dew, and the consequence was a foggy picture. The reason and cure are very simple. While focussing I put the cap in my pocket, which was warmer than the lens, hence the dew when I put it on the lens and exposed the plate. If I had not chanced to look at the lens at the beginning, I would not have seen it, as it would have probably disappeared when putting the cap on again.

Vignetted Busts.

Several of my amateur friends seem to find a difficulty in producing good vignetted portrait prints. The following arrangement may prove useful to some who find it troublesome in getting softness in the vignette, and especially where the bust is cut off. The arrangement consists of making a direct vignetted bust on the negative, and this is arrived at, by placing a piece of

ground glass with a slight arc cut out, a few inches in front of the lens so as to be quite out of focus when taking the portrait. The small upright which carries this ground glass must be made to move up or down easily, so that the necessary amount to be cut off can be readily adjusted.

To Avoid Halation.

The simplest way to avoid halation is to back your plate with ordinary black American cloth, smeared with glycerine to make it adhere. Before development it can be easily stripped off, and the glass wiped with a clean cloth.

Adapting Films to Dark Slide.

The best and most satisfactory mode of holding films in an ordinary dark slide is as follows:—Procure some stout cardboard, and cut two pieces, so that they fit firmly inside dark slide; then, when you put films in dark slide, back each with the cardboard, which, by the way, should be blacked, and you will find the films lie perfectly flat. These cards will also answer the purpose of carriers for smaller films, by drawing the required sizes of the smaller films on the cards with a pencil equidistant from their (cards) centres, and about half-an-inch from each corner of these rectangles, to make a slit at an angle of forty-five degrees from the sides, so as to insert corners of films.

To keep Slides free from Dust.

In summer, double backs are apt to gather dust, which penetrates and settles on the contained plates, and cause spots where the specks fall on the image. A good plan to prevent this has been recommended by Captain Abney, who rubs a little glycerine all around the rebates of the slides; this intercepts the dust.

To make Slides Work Smoothly.

To make dark slides, sliding tripod legs, etc., work smoothly, rub on the edges, etc., where contact takes place, a little household blacklead; but a little goes a long way.

A Simple Flash-Light Apparatus.

Take an ordinary clay pipe, wrap a piece of absorbent cotton round bowl, saturated with alcohol. Draw a piece of rubber tubing over pipe stem about a foot or so long. Weigh out magnesium powder, and place it in bowl of pipe. Focus your subject. Ignite the alcoholic cotton, and blow through the tube simultaneously. The powder will rise with an effective flash, the flame being about six inches above the bowl. Shut the eyes when blowing to prevent the mischief of sudden light shock.

An Improved Flash-Light.

Herr Gotz, of Vienna, recommends as a flash-light, aluminium foil between thin sheets of gun-cotton impregnated with chlorate of potash. The light is economical, is exceedingly actinic, and is absolutely smokeless.

A Flash-Light Wrinkle.

Excellent flash-light photographs of single sitters are easily obtainable by giving the subject a book to read, so that the eyelids are naturally somewhat drawn down.

To Photograph Lightning.

To photograph lightning at night, rack out camera to focal length of lens; point it to quarter whence flashes come; count seconds elapsing between one flash and its successor; repeat this observation several times, to obtain as accurate as possible an estimate of when next flash may be expected. Count the fixed number of seconds and take off cap; if a little too early no harm will be done; soon as flash has appeared re-cap and develop.

To obtain Softness.

Some people, to obtain softness, give a turn or so to the screw, getting the picture out of focus. This is a very poor substitute for softness. The difference can be seen at a glance. Softness is produced by correct lighting, full exposure, and careful development. Don't

make your negatives too dense. They should not fade away in the hypo. bath. If printing a large head, gum sensitised paper to bottom of negative by two strips of gummed paper, proceed with printing till image is fairly delineated, remove the back, and insert a piece of smooth tissue paper, then continue printing till finished.

Hints on Composition.

Do not put your principal mass in the centre; have it on one side. You are advised by some to divide the length of the intended picture into three portions, and to put your chief mass on one of the central divisions, so as to have one-third the picture on one side, and two-thirds on the other. This rule may be useful to a novice, but it cannot be insisted upon, for it is constantly disregarded, and with good effect. An avenue or a street, taken from the centre will be monotonous. Horizontal and perpendicular lines in natural scenery are to be avoided, if possible; sloped lines are better. The advice as to streets applies equally to streams. Objectionable perpendiculars and horizontals may often be changed into pleasanter lines by simply shifting one's camera. A part is often much better than the whole. Out of a prospect covering miles of ground, a bit comprised in a score of yards will often make the better picture. Houses, churches, and trees, when standing apart from each other, are simply so many objects. Tastefully grouped they form pictures. Oblique perspective improves the shapes of most regular objects. Where perpendiculars and horizontals meet, you may often by a tree or cloud, if high up, or a figure if on the ground, soften the right angle, of which you have already too much in the corners of your picture. A good effect compensates for an indifferent subject. A good effect is most often a fine opposition of light and shade.

Equal quantities are bad. Repetition of the same form on the same scale is bad. Lines, no matter how graceful, must not cut a picture in pieces. Important lines should not end abruptly, but be led off, as painters express it. And the chief line in the picture, particularly the sky line, must be balanced by contrasting ones,

or supported by masses of sufficient weight. If you need a little light in the foreground, a pail of water will bring the sky to your feet. The cottage and the road are brought together if a passer-by speaks to some one at the door. Figures should emphasize the character of a scene ; in the fields, a ploughman ; in the meadows, milkmaids ; on the hill-top, a shepherd ; in a park, the gamekeeper. These would have what artists call "keeping." We may continue :—on a village green, boys at play ; on a common, children minding geese ; at the cross-roads, a traveller asking his way ; vehicles, too, waggons and barrows about the farm ; a carrier's cart in the village ; a carriage and pair at the squire's hall door ; and in a watering-place, consumed with a desire to attract invalids, bath-chairs.

To Disperse a Crowd.

Most persons who have had any experience in photography in the streets of towns or villages, either at home or abroad, have at times experienced great annoyance, and had their pictures considerably marred, by the incongruous groups of persistent individuals who will frequently pose themselves in front of the camera, and obstinately refuse to move, much to the artist's discomfiture. Various dodges and stratagems have from time to time been suggested or resorted to for overcoming the difficulty, by circumventing the intruders, such as making a fictitious exposure, and then pretending to pack up the apparatus as if all was finished, and afterwards, when the group has dispersed, taking the picture ; and similar ruses. One plan that has been suggested is to have a "dummy" lens of somewhat pretentious appearance on the front of the camera, while a smaller one, which is to do the work, is fixed at the side, with a mirror placed at an angle of forty-five degrees behind it. By this plan the artist appears to be focussing or taking a picture in front of him, where the obnoxious individuals will have arranged themselves, whereas he is, unsuspected, really taking one at right angles—say, looking down the street instead of apparently across. When photographing the other day we eventually had

recourse to an expedient which served the purpose. Having been surrounded with a shoal of some hundreds of juvenile spectators, we first focussed the view desired to be secured, and then rotated the camera on the head of the tripod and ostentatiously pointed the lens in quite the opposite direction. Instantly there was a rush to the front in which the lens was now pointing. Addressing the crowd, and enjoining on them the most absolute stillness, we quickly rotated the camera back to its original position, uncapped for a second, and all was over before the multitude realised that they had been "sold."

Home Portraiture.

Every amateur who wants to start portraiture will generally place his sitter as close as possible to the window, and is astonished to find on developing his plate that he has obtained a wonderful and fearful hybrid, with one side of the face black and the other white. To such a novice we propound the startling theory that the further he puts his sitter away from the window the softer and more harmonious the lighting and the better the results obtained. If he does not believe this, let him set to work to prove it optically and practically on himself, for which purpose all that is necessary is a decent-sized hand-glass or mirror, a chair, and the would-be operator. Now let him seat himself in the chair close to the window and hold the glass so that he can see his face plainly, and yet so that the glass shall not cast the reflection of the light on to the face, and he will find that one side of his face is brightly illuminated, but the other has a heavy black nose shadow, and the other ear is hardly to be seen. Now let the chair be moved back from the window about five or six feet, and the same operation be gone through, when it will be seen that there is less contrast between the light and shade, and we know we can further reduce this contrast by the use of reflectors. More is to be learnt by thus figuring about and admiring yourself and features in various attitudes and positions as regards the window than any amount of reading how to do it.

Indoor Photography.

A room should be chosen with as high a ceiling as possible, and with a projecting bay window whose openings extend as high as can be secured. If there are other windows, let them be closed, so that the light shall come approximately from one direction. Never mind the exposure; west or south will do, if only the quantity and direction of the light can be controlled. Place the camera close to the middle window, leaving only room enough to get behind it, and close the lower shutters behind the camera, leaving the upper ones above it partly open to secure a slight front illumination. Upon one side the shutters of the bay-window should be opened entirely, so that the most brilliant light falls upon the sitter from that direction, and then by regulating the amount of opening upon the other side the shadows may be softened to any desired extent. At first the effect should be examined upon the focussing screen of the camera, which should be of the finest ground glass obtainable. Use the full opening of the lens, and focus upon the eyes of the model, and the definition of the rest will take care of itself. A microscopic sharpness, by which every thread in the garments may be counted, is readily obtained by using a small aperture; but such precision is not wanted. Never mind about head-rests or their substitutes, but try to place the sitter in such an easy and comfortable position that such supports will not be needed. Avoid straight lines in the composition, and if the lens is of sufficient focal length there need be no fear of undue distortion of points nearest the camera. Standing just behind the camera, direct your sitter to glance in the direction which in your judgment gives the best effect, and then selecting some object upon which the eyes may rest the exposure may be made. With rapid plates, such as Seed 26, or Cramer 35-40, two or three seconds with bright daylight will be sufficient, using an aperture of $f/8$.

A Hint to Sitters.

If sitters were to wash their faces immediately previous to having a large (head) photograph taken, there would be less work for retouchers, and a better photograph would result. An interesting comparison

is that of a large head photograph immediately after sponging the face, and another taken an hour or two afterwards. The marks in the face in the latter case will appear hard compared with those in the first, for it is surprising how a lens can detect foreign matter in crevices; but for a photographer to ask his clients to wash their faces is, indeed, a difficult matter, and great delicacy would have to be displayed, but perhaps two labelled prints showing the difference would answer best, if they were hung in a prominent position in a studio dressing-room. This latter suggestion is well worth adoption.

Hints for Taking Interiors.

First of all be sure that your camera stands level; the best plan is to use a spirit level and a plumb indicator. If you use the rising front see after the swing back, or you will have "drunken" pictures. The plates I always use are "Ilford ordinary," and, if used carefully, no other brand can best them. The plates, of course, must be backed to prevent halation, and the best plan is as follows:—Cut a piece of black paper the exact size of the plate; then smear the back of the plate all over with glycerine, and then squeeze the black paper into contact. The best lens to use is a wide-angle doublet, but I have seen good pictures taken with Lancaster's wide angle ($\frac{1}{4}$ -plate, 10s. 6d.), which is a single one, but a rapid rectilinear should be used if possible. Now the most important thing is the exposure, and no rule can be laid down, but you must be guided by the light. I will give an extract from my note-book. The lens used was Lancaster's W.A.

DATE.	STOP.	LIGHT.	EXPOSURE.	REMARK.
April 14. 10.30	10	Very dull, rained hard	15 min.	Splendid results.
August 17. 12.30	8	Bright	7 min.	Splendid
Sept. 24. 4.45	10	Bright	10 min.	Good

These are my three best negatives, and though the above may serve as guides, the exposure is best learned by practice. And now comes the development. First remove the paper from the back of the negative. The formula I use is the well-known Ilford. A great many persons say, use the pyro first, and then add the ammonia to bring up detail. I myself have never tried it, but always use it full strength, and give, if necessary, an hour's development, and have never failed. The only failure I ever had was when I took an interior and never backed my plate, and then I had only myself to blame. I think if anyone goes by these instructions, they won't have many failures.

Photographing Animals.

Mr. Charles Reid, the master of amateur photography in the open, says that it is never well to attract the attention of animals by a sign or sound close to them. Let the call be made a hundred yards away if possible, and it will attract and hold the attention long enough for the exposure to be made.

Reproduction.

Photographers as a class do not take as much interest in copying as they should. It is a branch of the business which is quite profitable, and should receive more careful attention. I will take one class of copying, that of enlarging from a smaller to larger size by negative and contact printing on albumen paper with some effective work by your artist to give it force.

Supposing there is a card size head to be enlarged to 15 x 12 size. The card or original may be faded and hard, which is generally the case with old pictures. Don't mind that. Take the original, clean it with cotton slightly moistened with water, spot it carefully, very lightly, then make any alterations with ink and white colour mixed with yellow to match the colour of the picture. Fasten it to a head-rest; light it up by the side light or side window far enough back to avoid showing the grain of the paper. Use a quarter portrait lens, focus carefully, see that the camera is steady, stop the lens down just enough to sharpen the picture;

remember you don't want a microscopic reproduction of the grain of the paper, which, by the way, is a common mistake; therefore don't stop down to excess. Now expose, say about thirty to fifty seconds in a good light (using a rapid plate); during part of the exposure *vibrate* the camera slightly, or, preferably, *remove* the stop during the last five or ten seconds according to the extent you wish to soften or take away the hardness of the picture; this is not a new idea, but I have used it successfully for years. By this method you can secure a delicate negative from almost any old picture.

In developing, proceed with caution, use weak and partly old developer, adding new as you proceed. Always overtime so as to allow the use of old developer which gives better control of the lights.

Copying Engravings.

In copying engravings, old paper photographs, etc., let the exposure be somewhat short of full, as the lines will be sharper and more distinct, without showing the granularity and markings of the paper which result from a longer exposure.

Copying Silver Prints.

Professor Burton recommends that silver prints which are to be copied should be first enamelled. The glazed surface prevents reproduction of the grain on paper, which usually so bothers one in copying, and the half tones from some unexplained reason are fuller and more vigorous.

To Deaden the Glare of Bright Objects.

I have found the following preparation to answer this purpose very well indeed, and to a large extent it deadens or dulls over the bright parts without injuring the varnish:—

Russian tallow ...	...	...	...	$\frac{1}{2}$ lb.
Spirits of turpentine ...	...	...	...	$\frac{1}{2}$ pt.

First melt the tallow over a slow fire, or by a gentle

heat, and when thoroughly melted, pour in the turpentine, stir well with a clean stick, then with a clean brush go over the bright parts, or better still the whole of the object; by so doing the bright parts will become quite dull, and can be photographed with very good results. The preparation should be freshly mixed, and the photograph taken as soon as practicable, as the turpentine soon evaporates and leaves a greasy appearance; if a good picture or negative has been obtained, the preparation can be wiped off with a cloth, or piece of cotton waste, without damaging the paint or varnish in any way.



PART III.

Dark Room Dodges.

To Stain Glass for Dark Rooms.

Water	...	...	...	100 C.C.
Gelatine	...	...	...	5 grammes.
Nitrate of silver	...	...	...	1 gramme.

Glass coated with this solution is exposed to light until it assumes a reddish brown tint. It is then washed to eliminate the nitrate of silver. A surface is thus obtained through which the actinic rays do not pass. The colouration may be deepened by increasing the proportion of nitrate of silver up to three or even four grammes. Glass tinted in this way may also be used to shade the dark-room lantern.

Ferrous Oxalate Developer for Dry Plates.

No. 1.

Neutral oxalate of potash	...	...	...	10 ozs.
Water	...	...	...	30 "

Dissolve.

No. 2.

Proto-sulphate of iron (ferrous sulphate)	...	...	...	3 ozs.
Citric acid	...	...	...	60 grs.
Water	...	...	...	10 ozs.

Dissolve.

For use take three parts of No. 1 and one part of No. 2. This solution will develop two or three plates in succession, if used within half-an-hour.

Hydroquinone Developer.

No. 1.

Hydroquinone	...	...	...	72 grs.
Water	...	...	...	6 ozs.
Sulphite soda	...	...	...	6 drms.

No. 2.

Carbonate soda	...	...	...	6 drms.
Water	...	...	...	6 ozs.

For use, take equal parts of 1 and 2, and dilute with equal parts of water.

Eikonogen Developer.

The following is a thoroughly good formula.

A.

Eikonogen	...	...	...	200 grs.
Sulphite of soda (re-crystallised)	...	...	200 ,,	
Dist. water, to make	...	...	20 ozs.	

B.

Carbonate of potass. (commercial)	2,400 grs.
Sulphite of soda (re-crystallised)	1,000 ,,
Dist. water, to make	20 ozs.

C.

Caustic potash	800 grs.
Sulphite of soda (re-crystallised)	1,800 ,,
Dist. water, to make	20 ozs.

Three parts of A to one part of B.

In cases of under-exposure or for instantaneous pictures, use C instead of B. To correct over-exposure add a few drops of 10 per cent. sol. potass. bromide. Fixing solution: Hypo. one lb., water, one quart. Use hot water to mix A solution.

Developer for Isochromatic Plates.

Stock Solutions.

No. 1.

Pyrogallic acid	...	...	...	1 oz.
Citric acid	...	...	...	40 grs.
Water	...	...	...	7½ oz.

No. 2.

Bromide of potassium	...	...	120	grs.
Distilled water	...	...	7	oz.
Strong ammonia, 880	...	...	1	oz.

For use, mix one part of each solution with nineteen parts of water, and then combine the two diluted solutions.

Clearing Solution.

Alum	...	...	...	...	1	oz.
Sulphuric acid	...	...	...	...	1/4	oz.
Sulphate of iron	...	...	...	...	3	oz.
Water	...	...	...	...	20	oz.

A Reliable Negative Varnish.

Take shellac two ozs., and dissolve with shaking at intervals in 20 ozs. methylated spirit. When all is dissolved, add one oz. of finely-powdered chalk or whitening to clear it. All to stand for two or three days. If not perfectly clear, filter through a paper funnel with a tuft of cotton wool inserted in the point. Soak the wool first in methylated spirit.

Uses of Ammonia.

Ammonia in tepid water, makes a wash that will soften and cleanse the skin.

Ammonia fumes, inhaled, will frequently relieve headache.

Ammonia fumes, inhaled through the nose, will cure influenza in its earlier, and greatly relieve in its latter stages.

Ammonia fumes, inhaled through the mouth, will greatly relieve a bronchial cold.

Ammonia liquor, (dilute say one part in forty water), if sponged over a faded carpet, will restore the colours.

Ammonia liquor, same strength as above, will clean windows.

Ammonia will cure a new chilblain or frost-bite with two or three applications.

Ammonia will at once neutralise the effects of acids spilt on the skin or clothing.

Ammonia, applied with a flannel rag, will keep nickel or silver goods bright, and prevent their tarnishing.

Ammonia will clean brass door-plates, brighten scale-pans, make brass candlesticks shine brighter than the candles. It will remove fruit stains from fabrics, and in most cases restore the fabrics to their original colours. It will restore a fainting woman quicker than burnt feathers, not to speak of all the things it will do in the way of forcing (and fogging) under-exposed negatives, fuming sensitized paper, and a host of other operations known to photographers. In fact, ammonia will do almost anything—except pay your quarter's rent.

An Ammonia Developer.

Stock Solution.

Water	...	...	...	...	4 ozs.
Sulphite soda	...	...	...	180	grs.
Bromide potassium	...	...	...	180	"
Liqour ammonia (·880)	...	...	...	5	drs.

For use, add to six ounces water, one dram stock solution and twelve grains pyrogallic acid.

Best Method of Washing Plates.

The *Amateur Photographer*, in a recent issue, gave details of some experiments in washing plates by various methods which deserve brief repetition here. The conclusions gathered from the article are, first, that when washing in dishes, where the surplus water simply flowed over the edge, if the plates are placed film down washing is twice as effective as if films are upwards; second, that in using washers, a much more thorough elimination of pyro. can be obtained in those washers where the flow of water goes in at the top and out at the bottom than where the reverse is the case.

Developing during Exposure.

A writer in *Le Moniteur* has a plan for developing during exposure. He immerses a plate in the hydrokinone developer, drains and exposes; and states that when the exposure is a fairly long one, the development is completed in the camera. There seems such a wild air of

impossibility about this, that we can hardly believe it true, but the suggestion is worth looking into, as a simultaneous development and exposure would be immensely convenient.

To Dry a Negative Quickly.

If you want to dry a negative quickly, place it in a dish of methylated spirit for five minutes, take it out and it will dry very quickly. Be sure the hypo. is thoroughly washed out before doing this or you will have trouble.

Intensification—Weak and Strong.

In the following paragraphs, various methods of intensifying gelatino-bromide plates are arranged according to the amount of density producible by their means.

No. 1.—*Very Slight Increase of Density.*—The wet negative is wiped back and front with a cloth, then immersed for a few minutes in a bath of methylated spirits; when taken out it is drained for a few seconds, wiped again with a dry cloth, and held before the fire or over a gas flame, keeping it at a safe distance at first, and in a horizontal position. Should any opalescent stains appear, they can easily be removed by re-wetting the plate, and drying without heat, after the use of the bath of spirits.

No. 2.—*Slight Increase of Density.*—The plate, after being washed from the hypo., is immersed in a saturated solution of bichloride of mercury in water. It should remain in this bath until it becomes white; if it refuses to bleach it is probable that the hyposulphite has not been all removed. The bleached plate is rinsed for about three seconds—not more—in water, so as to remove the surplus mercury solution from the surface, then it is at once dipped into a bath consisting of a semi-saturated solution of sulphite of soda. This second bath will slowly turn the plate black, and will also, as a consequence of the insufficient washing, cover the surface of the film with a dense white deposit, which cannot be rubbed off; but this deposit will very

quickly dissolve away in the final washing, and leave the image perfect. The density will remain the same if the plate is dried slowly, but will be increased by drying quickly, according to No. 1.

No. 3.—*Moderate Increase of Density.*—The plate is treated precisely as in No. 2, except that a thorough washing is given between the bichloride of mercury and the sulphite of soda baths. This gives additional density. No white deposit will be produced, but a good final washing should be given. Extra density may also be produced by quick drying.

No. 4.—*A Vigorous Intensifier.*—The plate, or rather the film upon it, is bleached in a saturated solution of mercury bichloride in water, washed, dried; then, *when dry*, immersed in a semi-saturated solution of sulphite of soda, washed again and dried. The only difference between this process and No. 3, is in the drying of the plate between the mercury and sulphite of soda baths. This drying causes a decided increase of density.

No. 5.—*A Powerful Intensifier.*—This, the well-known ammonia process, is about equal in strength to the preceding. The plate is bleached as before, and washed *thoroughly*. If the washing is too short, stains will be produced which cannot be removed. After washing, the wet plate is immersed in very weak ammonia (water, twenty parts; ammonia, one part). The plate instantly turns black. A fair amount of washing should be then given to secure permanence and freedom from stains. Dry slowly, if the density is sufficient.

No. 6.—*A More Powerful Intensifier.*—The process is the same as No. 5, but the ammonia solution may be used weaker, and the plate immersed in it for a longer period. The drying should also be rapid, as in No. 1.

A One-Solution Intensifier.

Nitrate uranium	...	...	1 gr.
Red prussiate of potash	...	...	1 "
Glacial acetic acid	...	...	20 "
Water	...	...	200 "

A Non-Poisonous Intensifier.

Soak the negative in water till soft, then drain and immerse in a bath of—

Ammonia	1 oz.
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Water	1 "
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for a minute and a half, and then place in—

Cadmium bromide	15	grs.
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Alcohol	35	ozs.
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till sufficiently intensified.

Local Intensification.

It frequently happens that intensification is desirable in some parts of a negative which in other parts is already sufficiently dense. In such a case the negative should be thoroughly wetted, then placed in a horizontal position, and the bichloride of mercury solution applied with a large, soft camel-hair brush. The previous wetting will tend to prevent harsh edges being formed around the intensified parts. After washing, if a *slight* increase of density is wanted, the sulphite of soda solution is applied; if a greater degree of vigour is desired than this will give, a weak ammonia may be used instead, either alone or mixed with the sulphite bath, according to the density desired.

In the case of a negative which has had a part only of its surface bleached, it is essential to use a copious supply of running water to wash away the mercury solution. If the plate were merely placed to soak in a dish of water, the mercury contained in the gelatine would soon be diffused thorough the water, and by re-acting on the film would cause a general bleaching of the whole surface.

Recovering Fogged Plates.

It may be worth recording that a plate accidentally exposed to light need not be thrown away. Make up the following solutions:—

No. 1.

Potass. bichromate	10	grs.
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Water	1 oz.
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No. 2.

Potass. bromide 10 grs.
 Water 1 oz.

Soak plate in a bath containing equal parts of above ; wash thoroughly and dry in dark. Plate then can be exposed again in camera, but sensitiveness is greatly decreased, and will not yield an image unless exposure is prolonged to perhaps ten times more than plate would have required in its original condition. In this connection also, as an experiment, we may also expose a plate in the camera and treat it in the same way. Plates giving green fog will, after this treatment, give clean images.

To make Negatives Brilliant.

Take a rag and moisten it with a few drops of essence of terebine ; rub the gelatine surface of the negative, and when the rag has become dry, moisten it again and again as often as the surface of the plate makes it necessary. A negative well rubbed up in this way shines like a mirror.

Over Exposure, and the Means to Correct it.

A slight over exposure may be corrected by the usual addition of a few drops to the ounce of developer of a ten per cent. solution of a bromide, but with excessive over exposure a citrate developer is preferred ; made as follows :—Dissolve one ounce ($437\frac{1}{2}$ grains) of citric acid in four fluid ounces of distilled water, add of a saturated solution of carbonate of soda sufficient to just neutralise, then add water to make measure ten ounces, and you have a ten per cent. solution of citrate of soda ; one drachm to three ounces of developer, containing about one-third or one-half the usual quantity of alkali, will save a very much over-exposed plate.

To get the Best Results from Instantaneous Exposures.

They should be treated in development according to speed of exposing shutter and subject. Some will give best results by using same developer as for a time

exposure, others may require a more powerful developer ; for instance, a seashore or marine view, using a very rapid plate and shutter at a speed of a fiftieth or seventy-fifth of a second with F-II stop, will generally respond to a normal developer of, say, two drachms of a one in four solution of carbonate of soda (dry granular) or potash, in four ounces of water ; the exposed plate to be immersed in this for one minute, then rinse well under the tap, and before returning plate to the pan add to the water and alkali three drachms of solutions of pyro. and sulphite of soda (one of the former and four of the latter, in sixteen ounces of water), and two drops of a ten per cent. solution of bromide of potassium, keeping the solution in gentle motion and covered from the light, to give time to the developer ; and if at the end of three minutes full development is not secured, a half to one drachm of the soda or potash may be added.

For an exposure of from one-hundredth to two-hundredth of a second, from a half to one ounce of a twenty-five per cent. solution of soda or potash to three ounces of water may be used, and after bathing the plate and washing, three to four drachms of pyro. solution added, and two or three drops of a ten per cent. solution bromide of potassium. The development will be more rapid than with former developer. This strong developer requires care in using, especially in hot weather, and the plate should be passed into the solution as soon as developer is rinsed off.

A Developing Dodge.

When the high lights are up, take the plate out of developer and lay it horizontal. The developer remaining on the plate will of course go on working ; that on the parts already up will exhaust itself in a very short time, whilst that on the other parts of the plate will still retain its activity. Thus the details will come up before the lights have become too opaque, and the negative, which would have been hard, will be quite soft.

Stripping the Films of Gelatine Negatives.

The following method is recommended by Mr. Jaffé, editor of *Die Photographie* : The negative, which should

have been taken on a gelatine plate specially prepared for being stripped, is coated after drying with a fifteen per cent. solution of gum arabic, and the solution is allowed to drain until but a small quantity of it remains on the plate. A gelatine film, corresponding in size to the negative to be stripped, is then taken and placed for a short time between sheets of moistened blotting-paper. The film is then laid on the prepared surface of the negative and pressed against it, commencing at one edge of it and gradually giving way. In the case of large negatives, a second person should be present to facilitate the manipulation.

To make a Rocker.

Procure a piece of flat inch board about 16 ins. by 9 ins., draw a line down the centre of one surface parallel to the longest dimension. At 2 or 3 ins. from either end, on this line drive two screws, leaving the heads projecting about 1 in.; file the heads to points. In the middle of board on same side as projecting screws bore a hole and insert a stout piece of wire or iron rod about 2 ft. long, and make secure by bending in a wedge shape so that wire cannot pass through the whole; at the other end attach a weight about 6 or 7 lbs.—a dumb-bell or two will answer very well. To use it put two tables of the same height together, on each put a penny or metal disc for the points to rest on. Instead of two tables, cut a slot for the pendulum, in a shelf or bench, which you may use as a developing table, and your “rocker” is complete.

Another Method.

Get a flat board, and at each end attach a rod 2 or 3 ft. long, bendable, which curve, and at bottom fix a weight thereto. Then balance board on a flat piece of lead, bending rod at bottom until board comes level.

Loss of Intensity.

Ten drops of ammonia added to one pint of usual fixing bath will obviate that annoying loss of intensity in prints which sometimes occurs in the hypo. bath.

To make Colour-Sensitive Plates.

A thin emulsion made with but little gelatine is used, and each plate is flooded with the following solution, allowed to remain in contact with it till the film is softened, and then rinsed. Erythrosine solution, containing one part of the colour in one thousand, fifty parts; silver nitrate solution, containing one part in a thousand, fifty parts; ammonia, three parts. Alkaline pyro. or hydrochinon is recommended as a developer.

Coating Plates with Emulsion.

Although most photographers purchase their plates, and these are ordinarily machine-coated, not only the experimentalist, but also the practitioner, often has occasion to coat a few plates. In such a case the following hints will be useful.

The emulsion is melted in a water bath, say at a temperature of about 100 deg. Fahrenheit, and is filtered through very fine and carefully-cleaned muslin to the centre of which a thread is attached, so that the emulsion can run down without forming air bubbles. The receiving-cup should also stand in warm water. A clean glass plate being now taken on the pneumatic holder, a small ladle-full of the emulsion is dipped out of the receiving vessel and poured on the centre of the plate, and is spread over its surface by means of a bent glass rod. After a little rocking, to make the film even, the plate is put on a level slab of plate glass to set. A suitable ladle of convenient size, may be a silver spoon, table, dessert, tea, or salt, with the stem bent a little just beyond the bowl, or a clay pipe.

Temporarily Fixing Negatives.

Dip them five minutes in the following bath:—

Water	...	...	...	150	parts.
Bromide of potassium			...	5	"
Glacial acetic acid			...	5	"
Alum			...	5	"

Then wash and dry. The negative can then be kept, even in the light, without injury for several days.

To Remove Water from Varnish.

To remove water from alcohol varnishes:—Cut a sheet of gelatine into shreds, and place it in the varnish. This will be found, in a little time, to have absorbed the water, and the varnish will give a clear and brilliant coating when used.

To Reduce Negatives.

Immerse the over-dense plate in the ordinary hypo. bath, to which has been added a few drops of a solution of ferridcyanide of potash (forty grains to the ounce of water). Reduction will proceed in proportion to the amount of ferridcyanide added. When sufficient reduction has taken place, wash the plate thoroughly to prevent further action.

Another Plan.

Soak the plate for two or three minutes in a solution of perchloride of iron (half drm. to each ounce of water), wash well, and immerse for two or three minutes in a weak solution of hyposulphite of soda, and wash again thoroughly. Lift the plate from the iron solution to watch the reduction, and allow more density than required, as the hypo. will reduce it a little more.

Local Reduction.

For local reduction where the high-lights are too dense, take an old soft cloth, wet with alcohol, and rub with finger on parts to be reduced until sufficiently thin. This will be found a great improvement to many negatives, simple and no risk. Alcohol, with a touch of castile soap, will remove almost any yellow stains that appear on prints after they are dry or burnished; also metallic spots.

A Simple Plate Lifter.

Procure a strip of tin about three and a half inches by one inch, and bend it, so that when the lower piece

is laid flat on the bottom of the developing dish, the upright portion rests against the side, and the top part projects over the side of the dish. This will in no way interfere with the plate or solution, but on pressing the projecting piece it acts as a lever on the edge of the tray and raises the plate out of the solution.

A Developing Swab.

A little tuft of cotton wedged into the end of a small glass tube with a piece of wood, makes a handy swab to use in developing, &c., for removing air bells or local applications of restrainer or accelerator. It is quickly made, and does away with the annoyance of floating hairs dropped from camel-hair brushes after they have been used for awhile.

To Wash Negatives quickly.

Place the negative under the tap, and turn the water on so that it will fall with considerable force. Hold the plate diagonally, and turn it round occasionally. While the water is falling on it, go over the surface with a camel-hair brush or a soft sponge, always moving from centre outwards to margin. In a few minutes the hypo. will be eliminated.

Judging Development.

M. Lumière, of Lyons, gives very good advice as to how it becomes easy to judge of the right moment to stop development. Suppose you have a lantern with a very large surface lighted up, it is impossible to judge if sufficient intensity has been attained or if all the half tones are visible. If you now allow a dark piece of paper having a hole no larger than a half-crown in its centre to fall over your lantern, you will be surprised and enchanted to perceive that you can see distinctly the value of your negative, because all the other rays emerging from the lantern are prevented from entering your eye.

Method of Orthochromatising Gelatine Plates by means of Cyanine.

Use freshly-prepared plates, those only a month old often giving foggy, weak, and unsatisfactory results. A solution of cyanine in pure alcohol is prepared; this solution, containing one-quarter of a grain of the dye to each ounce of spirit, is poured on the plate like varnish and allowed to dry off, but little or none penetrating the film. When dry, the plate is soaked for two or three minutes in water, and is exposed wet, the development and after-treatment being as ordinarily.

To Make Glass Non-Actinic.

Sulphate of quinine concentrated and coated on glass is said to render the light passing through such glass non-actinic.

Utilizing Old Negatives.

On the subject of the utilization of old negatives glasses, a contributor to *La Nature* says, he takes his old negatives, cleans them carefully, and uses them to frame prints. He takes two of these plates and places the print to be framed flat between them; then he takes four red elastic bands, two of which are put on parallel to the sides and two parallel to the ends, thus forming a sort of Oxford frame. The frame is hung up by a loop in the back of the upper band. It is also suggested that it would be as simple to gum a binding round the edges of the two pieces of glass in the style of the old-fashioned *passepартout*.

To Protect Unvarnished Negatives.

Herr Goltzsch suggests as a protection to unvarnished negatives against the effects of damp in the printing paper, that they should be rubbed over with linseed oil. The negative should first be freed from any deposit left by the developing bath by being well-rubbed by a clean tuft of dry cotton, then the linseed

oil should be rubbed on with another tuft of cotton, which should afterwards be kept for future use, in a well-stoppered bottle. It will thus be kept free from dust and remain flexible. If it should be necessary to reduce or intensify the negative afterwards, the linseed oil may easily be removed by means of alcohol.

Retouching.

The Photographisches Archiv gives the following method for retouching unvarnished gelatine negatives:—Grind a small quantity of resin to powder, and spread the powder upon plate with about a third of its own volume of sugar, in order to make it less viscous and glutinous. Having mixed the sugar and resin well, put the mixture in a small bag made of well washed muslin, and dab a little gently on to the surface which is to be retouched; or it would be sufficient if a little of the powder were taken up by the point of the forefinger and applied by gently rubbing to the surface to be retouched, until a surface matt enough to take on the pencil was produced.

To Remove Films from Negatives.

Soak the negative in a solution of chrome alum for ten minutes, then coat with enamel collodion; when this has set well, wash the plate thoroughly, and immerse in a solution of hydrofluoric acid (one in eight) till the film loosens; gently lift up one corner and float off into a clean dish of water, and then on to a collodionised plate, which has first received an edging of india-rubber solution, and dry.

To Repair Broken Negatives.

Place the negative, gelatine side down, on a plate rather larger than the negative. Coat the edges of the fragments with warm Canada balsam; join them together, using strong pressure. Remove the excess of balsam, then cover the negative with another plate exactly of the same size, and previously coated on one side with neat varnish:—

Sandarac ...	...	...	3 grammes
Mastic in tears ...	...	...	3 "
Sulphuric ether ...	...	...	50 "
Benzole, pure ...	...	...	25 "

Lift together the three plates, turn them over, remove the large one that has served as a support, scrape off from the gelatine side the balsam that may have exuded, then surround the two plates with strips of gummed paper. Heat slightly the fragments before joining them together. This process will yield a print upon which no trace of breaking is to be seen.

A Neat Dodge.

Those who like to see their negatives neatly finished cannot do better than scratch a line on the film round the subject before varnishing, and afterwards painting the space between the line and the edge of the glass with Bates's black. The line, of course, prints black, and the Bates's black makes a clean white margin.

To Make Distilled Water.

Those of our readers who prefer to make their own distilled water for such photographic operations as require considerable nicety, and who consider glass the best material for heating the water in, will be obliged to Mr. Stanley E. Parkill for pointing out a method of preventing that well-known "bumping" which always accompanies the boiling of water in glass vessels. He simply roughens the inside of the flask by placing a few pieces of fluor-spar and a little sulphuric acid, after warming the vessel till the action commences, leaving it on one side for a short time. The fluoric acid liberated etches the surface, and it is then capable of sustaining rapid boiling without any bumping whatever.

To Make Paper Negatives.

A paper negative can be made from an unmounted print placed face down on silver paper in printing-frame same as a glass negative. Print deep and tone same as silver prints. In case a good negative gets broken you can thus make a good substitute.

Method of Drying.

The *Revue Photographique* says that the method of drying a negative has much influence upon the intensity of the image. A negative dried near a fire is more vigorous than if it had been dried at an ordinary temperature. A negative may be intensified by being wetted and then dried quickly, several times in succession.

Increasing the Sensitiveness of Plates.

Mr. Friese Greene had found that by giving a plate five or six successive coatings of a very thin emulsion, the sensitiveness of the resulting coat was greater than if the same emulsion had been put on in one very thick film.

A Good Filter.

Make a cone with a piece of writing paper, and gum the sides together, leaving a small opening at the bottom ; put a piece of clean sponge into this opening, and you will have an excellent filter.

Sky Negatives.

Choose clouds just off evening sun, focus carefully, use slow plates, say, Ilford ordinary, put in smallest stop, develop slowly with little alkali.

To Clean Bottles.

Into each bottle pour half an ounce of strong nitric acid, and one ounce of shot ; cork, shake for five minutes, pour out, wash well in water, put in hot water and soda, wash and dry.

To Preserve Labels.

To preserve your bottle labels, rub them with a little paraffin, wax dissolved in turpentine, this will prevent them being either torn or rendered illegible.

To Stop Leaky Trays.

If your wooden baths leak, dissolve a little fine orange shellac in methylated spirit, and apply the solution to the joints with a brush.

Pinholes.

Cover the holes with retouching varnish and allow to dry, and then work over the holes with a HHH lead pencil, cut to a fine point.

Substitute for Weight.

If you mislay your ounce weight, don't waste what may be valuable time in hunting for it; three ordinary penny pieces weigh exactly one ounce.



PART IV.

Printing Tips.

Sensitizing.

THE operation of sensitizing and drying paper must, of course, be carried on in the dark room. The sensitizing bath is made up in the proportion of

Nitrate of silver	...	...	...	50 grs.
Water	...	...	...	1 oz.

When the silver is dissolved, the solution should be carefully tested with litmus paper, and diluted ammonia added in drops, until red litmus is *slowly* turned blue; care must be taken, however, that the bath is not too alkaline.

Sufficient of this solution is poured into a clean porcelain dish (measuring 12 x 18 for $\frac{1}{2}$ sheets, or 12 x 10 for $\frac{1}{4}$ sheets), to fill it, at least, a $\frac{1}{4}$ in. deep. Before being used, the surface of the solution must be lightly skimmed with a strip of tissue paper, to remove any dust that may be floating thereon.

The albumenized paper is now cut in half, or in quarter (according to the size of dish); one sheet is taken by opposite corners, albumenized side down, between the thumb and index finger of each hand; the left hand is now lowered until one corner of the paper rests on the surface of the bath. The right hand is next lowered until the whole of the paper is floating on the bath. With a pair of ebonite forceps, lift the far right-hand corner of the paper, and, taking hold of the other side with the left hand, raise the paper from the

solution until one half of the albumenized side can be plainly seen ; should any air-bubbles be adhering to the paper they can be broken by blowing upon them. The paper is then lowered on to the solution, and the other side examined in a like manner.

It is allowed to remain on the bath for two or three minutes, when it is taken up at the right hand side and drawn over the edge of the dish, so as to remove the superfluous liquid. It is now attached by means of "American clips," or bent pins, to a cord stretched across the room, to dry, which it will do in a well-ventilated room, in an hour or two, when it is ready for printing.

Cheap Printing Frames.

Procure some stout cardboard and cut a piece the size of the negative. Fold it in half, taking care not to break it in two. Place on the negative, so that when one side is fastened the other can be opened so as to see the print. The cardboard can be easily fastened to the negative by the usual photo clips.

Vignetting.

Speaking in general terms, a vignette portrait is first made in the usual way by the agency of the ordinary vignetting glass or mask, and which for our present purpose we shall designate the negative vignette glass. The print having then been removed from the printing frame, is exposed to light for a period determinable by the effect desired under a positive vignette mask, that is one in which the centre is opaque and the margins clear glass. This protects the figure from the light, and permits of the rest of the paper darkening with a vigneted interior which merges into the soft surrounding the portrait already possesses.

Another way.

A beautifully soft vignette, after the fashion of a greyed vignette, may be obtained by printing the negative under paper of about the opacity of ordinary writing paper, out of which the necessary serrated opening has been cut, and the whole covered with tissue paper.

Harmonizing Prints.

A well-known professional photographer told me of the dodge of pasting a sheet of tissue paper on the back of a negative whose high lights were, through under exposure, greatly exaggerated, and touching with gum water the parts immediately over the high lights, thus securing a much more harmonious print. But I found this plan did not afford sufficient transparency, so I tried another method, and find it in every way superior. It is as follows:—White hard paraffin, six parts; petroleum, two parts. Dissolve with gentle heat, apply warm with a paint brush. It instantly renders the spot touched beautifully transparent, and thus a hard negative may be made to yield a harmonious print.

Blending Skies.

First, a very simple method is to place the frame in a position where it will receive diffused light only. Then, having a piece of cardboard large enough to protect the parts desired, cut its edge to conform somewhat to the horizon, unless it be nearly straight, and with mucilage attach cotton batting along the edge of the card, and pull it out into thin shreds to gradually blend the edge of the card. The card may then be laid flat upon the printing frame, the cotton doing all the blending; or it may be laid at an angle, the edge with the cotton being raised more or less to allow a little light to pass under.

When in a hurry one can print in the sun, and blend by moving the cardboard constantly. If it is allowed to remain still for an instant, an edge will be the result. It will be found very convenient to keep several cardboards about, with their cotton batting attachment, the edges of the cards differing in outline so as to fit different subjects.

Printing in Clouds.

When printing in clouds, it is necessary to have the sky of the print nearly, or quite, unacted upon by the light, which is the case only when a strong negative is used, or the sky protected in some manner while the rest is printing. Sometimes the sky, if thin, is stopped

out with Gihon's opaque, or other water colour. It takes a very delicate hand and considerable patience when the horizon is at all irregular ; and when, as in some marines, vessels are shown with spars and rigging extending up across the sky, it is next to impossible to stop out around them. It can be done only on the film side, and is very troublesome there.

One of the most successful ways of managing such cases is to coat the film side with a matt or benzole varnish having a fine grain, yet with a sufficient tooth to take a very soft lead pencil. The fine work can be done more easily with the pencil than with the brush, the latter being used after the delicate parts about the horizon, or objects extending above, have been finished.

Registering Prints.

Get an opal plate (the surface of which can be written on in pencil) and cut it, or have it cut, into strips of about half-an-inch wide, and say, two inches long, and let them into the sides of the printing frames, fastening them in, either with a little plaster of Paris, or with little strips of thin brass nailed with the finest little brass nails. When about to print from a negative, write on the top of the opal slip the number of copies required, and draw a line under it, and, as the copies are printed off, put a stroke underneath for each one. This will enable you to see at a glance the number printed.

Another simple method is, after placing the sensitised paper in position on the negative, to write the figure 1 in pencil on the back of the paper in the left-hand corner, and, when changing, write 2 on the next copy, and so on till the full number of copies required is made.

Registration.

Take a piece of stout mounting board, the thicker the better, provided its thickness does not exceed that of the negative. Cut it, say, a quarter of an inch smaller than the glass of the printing frame, taking care that two of its sides are at exact right angles to each

other, so that it will fit accurately into an angle of the frame. In this board cut an opening a little larger than the negative to be printed from. If the plate glass does not fit tightly in the rabbet of the printing frame it must be wedged in, as it is imperative that it be a fixture. Next take a negative and place it in position in the opening in the cardboard, when the latter is pressed close to the corner of the frame, and secure it firmly to the glass with strips of gum paper. Now it is obvious that, as the negative is a fixture on the glass, the cardboard and everything that may be attached to it will always be in register when it is pressed close into the corner of the frame, notwithstanding the thickness of any medium that may be interposed. Register marks may be ruled on the card-board, or what will be found better in practice, the sensitive paper may be attached to it by the corners with cement—a solution of india-rubber by preference, as that will cause no expansion or cockling of the paper. In order to avoid all risk of movement in closing the frame the card may be wedged up with a couple of V-shaped pieces of the same board.

Improving Dense Negative.

It is wonderful how a little "dodging" improves almost any negative. The simplest plan is this:—Matt-varnish the back, scrape away the varnish opposite the dense parts of the negative, and colour with a little indigo over those parts which print too rapidly. A black and white "horror" may be made into a most harmonious whole, without any loss of real brilliancy, by this method.

Printing Cracked Negatives.

If you have a negative that is cracked (the glass only) you will be able to obtain a good print by placing in the frame first a piece of plain glass, and on the outside of the frame paste a piece of white tissue paper; then print in the sun, turning the frame around occasionally.

Economic Toning.

With an old acetate toning bath we obtain warm purple tone with 2 grs. gold for every 60 cabinets, equal to four sheets or half grn. gold to the sheet of paper. After three or four waters, or rather after the prints no longer give any definite trace of silver in washing, 2 ozs. of a saturated solution of washing soda are poured into a dish of clean water; the prints immersed one by one and well turned over for five or six minutes. This water is carefully drained off and fresh placed in dish; the toning bath is poured out, 2 grs. of gold added, mixed in with the hand, and by the time the prints have begun to separate in the washing dish, 20 or so are picked up one by one and thrown on to the left hand and well drained, then thrown face down into the toning bath in a flat mass; another 20 are treated in a similar manner, and the whole lot turned face up and the third 20 are added. Toning takes about 20 minutes.

Clearing Discoloured Prints.

If your silver prints have yellowed much before toning, put them for two or three minutes (after toning, and before fixing) in a solution of ammonia, 2 drms., water 10 ozs., this will clear them beautifully.

Black Tones.

The following, with considerably over-printed prints, will give blacks:—

Gold chloride	...	...	...	...	...	1 gr.
Soda	...	...	...	...	...	1 "
Lime	...	...	...	...	...	1 "
Water	...	...	...	...	...	10 OZS.

Toning after Fixing.

Numerous baths have been proposed for toning and fixing at the same time; but it may be useful, particularly if a toning bath is not handy, to first fix the prints, for they will not tone after the lapse of a certain time. The following is the formula of a bath which may be used with advantage:—

Sulphocyanide of ammonium	...	30 parts
Chloride of gold	...	0.3 part
Caustic potash	...	0.3 ,,
Water ...	...	1000 parts

This bath should be used immediately, for the caustic potash instantly decomposes the red precipitate which is formed when adding chloride of gold to the sulphocyanide. It will keep well, act very rapidly, and allows one to tone to a blue black. A purple tone is obtained by replacing the caustic potash by five parts of carbonate of soda.

Blisters and how to avoid them.

Put the water for your fixing bath, say four pints, on the stove and heat it as hot as you can bear your hands in it—almost boiling hot, pour it into your fixing dish and add one pound of hypo. soda and a small lump of bicarbonate of soda. Dissolve and put your pictures in the water for from ten to twenty minutes, or until clear, turning them over constantly. Take them out one at a time and throw them into water with salt dissolved in it; not a bucket of water with an handful of salt, but with enough salt dissolved to bear up a potato. Keep them there for ten minutes. You will now not be able to see a single blister. When, if you had fixed them in cold solution you would have seen perhaps a hundred. You can now mount and finish in the usual way and will have clean, bright pictures. The washing must be continued after coming from the salt solution for some time to remove all the salt as well as the hypo.

Another Receipt.

Soap in weak solution of Epsom Salts, previous to development.

Reducing Over-Printed Prints.

Dissolve one ounce of ferridcyanide of potassium (red prussiate of potash) in one pint of water for a stock solution. Break up one pound of carbonate of

ammonia into lumps so that it may be put into a five-pint bottle; after doing which fill the bottle with water. After dissolving all that will dissolve, a part of the solid mass will remain at the bottom, and the solution will be saturated.

After toning and fixing the day's prints as usual, including those that are darker than desired, remove all but the latter to the salt water, leaving the dark ones in the hypo. Now take a clean, white pan, large enough for the largest print which you wish to reduce, and pour a sufficient quantity of your fixing bath into it. Add a little of the ammonia solution, say, about one drachm to the quart of hypo. Then add enough of the prussiate of potash to colour the compound to a light lemon colour. Immerse one print at a time and let it remain until it is changed to suit the taste, then return it at once to the fixing bath. Proceed with each one in turn in the same manner, and when all are done place them with the others in the salt water.

If, on immersing the first print, you find it to be acted on too rapidly, the obvious remedy is to dilute the reducing solution; if it act too slowly add a little more colour.

Utilizing Waste Prints.

Instead of tearing up or crushing waste prints and throwing into the cuttings, they should be carefully put on one side and used as backings, that is, when a fresh piece of sensitised paper is placed on the negative a waste print should be placed next to it before the cloth back is put in; this will be found to preserve the purity of the whites in a marvellous degree, little or no trace of discolouration taking place if left in the frame for two or three days.

To Straighten Unmounted Prints.

Roll the prints, fresh from the bath, around a wooden stick, lead pencil, or glass rod, *film outside*. Slip a thin rubber band over them, to retain them and let them dry. It is better for perfect drying, not to roll them over one another, but each on a separate stick. When dry, they will be beautifully flat and smooth.

Mounting.

Use starch. Trim all prints before toning, and after toning allow them to become quite dry between red blotting paper. Take a teaspoonful of starch and mix in a pint basin with a small quantity of *warm* water (the basin having been previously warmed, by pouring boiling water into it) to the consistency of a thick syrup; then keep the starch continually stirred; pour over it boiling water, as small a quantity as possible so that the starch thickens, the object being to have the starch as thick as it is possible to make it, and for this reason the basin is hoisted before pouring in the boiling water. Cover the starch basin with a plate, and allow the starch to get cold. If the plate fits well down, no skin will form on the starch; if the skin forms, it should be carefully removed with a teaspoon. To paste the prints I use a paint-brush of about $\frac{1}{2}$ -inch in diameter, and have put a bridle on the bristles, leaving them about an inch long, and making them much stiffer. Take one of the dry prints, lay it face downwards on a sheet of paper or glass, and work into it with the stiff brush an even coat of starch, being, of course, most particular that the edges have special attention. Set it aside for two or three minutes, and in the meantime another or two of the prints may receive a coat of starch. By this time the starch will have soaked into the first print, and the print will have become quite limp and have lost all inclination to curl. Give now another coat of starch to the print, again paying particular attention to the edges, and, taking it up without placing the fingers on the margins, transfer it to the mount, cover it with a sheet of writing or blotting paper, and rub down gently at first, and afterwards using considerable pressure. An ivory paper-knife is a good thing to use. Put the prints away in a cool place, so that they do not dry too rapidly, as rapid drying has a tendency to causes the edges of the print to curl away from the mounts. Since adopting this method I have not been troubled with prints leaving their mounts as I was with the gelatine mountant. One great advantage of starch is that it allows of the print being lifted up if it is not placed exactly in position on the

mount, and adjusted to its proper place. With gelatine I found that where the print was placed down there it must stay, whether it was square in position or not.

A Home-made Squeegee.

For the benefit of those who have never used the "squeegee," we will say that it is merely a strip of india-rubber, say, an eighth of an inch thick, six inches long, and an inch wide, set into a suitable wooden handle like a piece of the ordinary weather-stripping for windows. It is thus a sort of elastic scraper, and is useful to the photographer for many other purposes than the one mentioned.

Mounting Aristotype Paper.

I find the best way to mount this paper is (after squeegeeing the prints on glass) to let them get half-dry then take well-made best glue, strained through muslin all the better, apply to the print; then well press on to this a card, same size as print, known as best thin ivory; then leave until quite dry. They peel off without any trouble. Trim with a sharp knife, and mount to another card, or whatever else you like.

Unmounting Prints.

I have always taken off any prints from mounts by putting a piece of wet, clean blotting paper a quarter of an inch larger than the print on it, and allowing it to soak for some hours, when, on raising a corner of the print carefully, it will separate from the mount, which can then be wiped with a wet cloth and put under a weight to dry, when it can be used again.

Spotting.

When large surfaces are to be covered, if your favourite medium will not adhere kindly to the albumen, take a little of the finest of powdered pumice, and with the tip of your finger roughen the albumen surface.

Burnishing.

The prints should be dry, and mounted. Dissolve 5 grs. of castile soap and smear over print, and allow to dry. The bar should just be hot enough to be held comfortably in the hand. When once in the burnisher, the print must be passed right through without stopping, otherwise lines will appear on the print.

Glazing.

If you really want as high a gloss as you can get, no burnisher will give you half as much as drying the prints squeegeed to ferrotype plates. This is also much easier than burnishing, and much safer. The only objection is the very brilliancy of gloss which you seem to wish for.

Enamelling.

Take a sheet of patent glass a little larger than the print, polish this glass thoroughly, then coat with enamel collodion. Let the collodion set about an hour, warm the glass before the fire to about blood-heat, and then coat the varnish over the collodion side; allow to cool. Take the unmounted print and pass it through a hot solution of gelatine, composed of 10 ozs. of water and 1 oz. of gelatine. Remove the print after it has been immersed in this solution, and lay it face downward upon the varnish side of the glass, and then use the squeegee, so as to bring the print into perfect contact. Leave this to dry about an hour in a cool place, take a piece of thin cardboard a little larger than the glass, dip this in the hot solution of gelatine, and lay it down on the back of the print which is on the plate; squeegee it well, and let the whole thing dry about twenty-four hours, and then run a knife round the outer edge of the mount, cutting it under the collodion, when the picture will come away quite freely.

Waxing Prints.

Dr. Eder gives a brilliant surface to prints upon albumenised paper by treating them with :—

White Wax 100 parts.

Dammar varnish 4 "

Rectified essence of turpentine 100 "

To preserve the solution it is put into a well-dried bottle, and when it thickens by evaporation a little more rectified turpentine is added.



PART V.

Processes.

Carbon Process.

Sensitizing Solution.

Bichromate of potash	...	5 drachms.
Carbonate of ammonia	...	14 grains.
Water	...	1 pint.

The tissue is sensitized by *immersing* in the above for three minutes,—two minutes carbon side down, then reversing it for the remainder of the time. On removal it is squeegeed upon a sheet of clean glass or zinc, to remove the surplus moisture, and at once hung up to dry slowly—which it should do in from six to eight hours in a well-ventilated dark-room. This paper is about twice as sensitive as albumenized paper, but, as the image is not visible during printing, it is necessary to use an actinometer. Johnson's single tint actinometer is a small box, the lid of which, with the exception of a transparent hole in the centre, is of a chocolate colour; the box contains a strip of sensitized albumenized paper which can be fixed under the lid. When the light has coloured the paper to the depth of the colour on the lid, it is termed "one tint"; the strip is pulled forward, and a fresh portion brought under the opening and again exposed as before.

The printer, having found by experiment, how many tints must be made before the tissue has received the proper exposure under a certain negative; if the

actinometer and the printing frame are exposed together, and at the same time, correct exposure can always be given to the tissue.

After removing from the frame, the action of light still continues, so that it is advisable to develop the tissue the same day. Take a piece of Sawyer's flexible support, somewhat larger than the tissue to be developed, and rub over the prepared surface a piece of soft flannel dipped in the following:—

Waxing Solution.

Bees' wax	...	...	...	1 drachm.
Resin	...	...	...	3 "
Turpentine	...	...	...	10 oz.

and polish off with a piece of clean flannel.

Immerse the waxed support and the tissue in clean, cold water, and when both are saturated, they are brought together face to face. Lay the adhering pieces, tissue uppermost, on a sheet of glass, and quickly apply the squeegee.

The exposed tissue is now ready for development. Place the print and support in warm water, about 105° Fah. In a few seconds the paper originally bearing the tissue can be stripped off, leaving the picture adhering to the temporary support. By gently laving hot water over this, the picture is gradually developed, when it is immersed in cold water for a short time, afterwards in an alum bath for fifteen minutes, and after being again rinsed in cold water, is ready for transferring to its permanent support, which may be paper, china, glass, ivory, or anything with a smooth surface.

Take a piece of double transfer, the required size, and immerse it in a dish containing warm water about 100° Fah. The picture on the temporary support is placed in cold water. As soon as the gelatinous surface of the transfer paper becomes soft and slimy, the two are lightly squeegeed together, and hung up to dry; when the picture may be stripped from the support, trimmed and mounted.

Should a highly enamelled surface be desired, the exposed tissue must be developed upon the collodionized plate in the following manner:—

A sheet of plate glass is cleaned, polished with bees' wax, and coated with enamel collodion. The tissue and collodionized plate are placed in cold water for a few minutes, brought in contact face to face, squeegeed, blotted, and placed under pressure for five minutes. The picture is now developed the same as if on the flexible support, but before the transfer backing is dry, a piece of thin cardboard is glued to it, and the whole placed under pressure until quite dry, when the card bearing the picture with a beautiful gloss may be cut and attached to the mount.

Platinotype Process.

The paper is prepared commercially, cut to size, and put up in packets, and supplied by dealers. The paper is rendered slightly damp by breathing upon it, or holding it in the steam from boiling water for a second. It is then placed in the frame and exposed to daylight in the usual way, the process of painting being observed in the same manner as a silver print. Grey tones are obtained in a weak light, while sunlight gives black tones. When dark enough the prints are immersed for a few minutes in a solution of

Hydrochloric acid 1 oz.

Water 70 "

until all yellowness has disappeared; they are then washed for ten minutes in clean water, dried, and mounted as usual.

Glazing Platinum Prints.

Herr E. Vogel says that to give a glossy surface to platinum prints they may merely be dipped in a weak solution of gelatine containing a little alcohol, after which the gelatine is hardened by a bath chrome alum.

If a higher glaze be desired powdered shellac dissolved in a cold, concentrated solution of borax may be employed; it takes several days to dissolve. The print should be floated upon this bath, then suspended to dry.

If still more glaze be desired the proof may be soaked in a solution of gelatine, then squeegeed face downwards upon a sheet of glass coated with collodion

of one per cent. When dry, the print is stripped off the glass.

Reducing Platinotype Wastes.

The residues consisting of developing solutions and acid washing baths, should be treated as follows, in order to recover from the platinum they contain:— Place the residues in any convenient vessel and insert some scrap zinc. In the course of three or four days a precipitate consisting partly of metallic platinum will be formed at the bottom of the vessel. The liquid may now be poured off and thrown away; the powder and the iron need not be removed until after many similar operations have been preformed. This precipitate and the residues from burnt trimmings, &c., may be sent to the refiners.

Enlarging.

Enlargements on bromide paper may be made by daylight or artificial light. The former is the most expensive and satisfactory.

The operation should be conducted in a room lighted only with one window, which must be covered with the exception of one opening, slightly larger than the negative to be enlarged from. The back of the camera, containing the negative to be enlarged with its film side facing the lens (preferably the one used in making the negative) is fixed over the opening as shown. An easel, bearing a sheet of white paper, is erected in a vertical position, parallel with the negative.

The light, direct from the sky, is reflected through the negative by means of a mirror or white cardboard placed at an angle of 45 degrees outside. The size of enlargement is regulated by the distance the easel is placed from the negative. Focus is obtained by adjusting the camera front bearing the lens. The lens is capped with ruby glass, so as to permit a non-antinic image to be reflected on the easel, and the sheet of bromide paper is attached to the easel in the required position. An exposure of from fifteen seconds to three minutes may be given. Develop according to the directions sent with the sensitive paper.

Enlarging on Alpha Paper.

Alpha paper can be enlarged upon, and produces very fine results, but the exposure is very long, the paper being 100 times slower than rapid bromide.

Hints on Bromide Printing.

1.—Proofs can be made upon bromide paper from the negative as soon as the fixing agent has been removed from it thoroughly. Wetting the paper and bringing it into absolute contact with the negative, exposing to the light of a petroleum or gas flame, and the subsequent ordinary method of developing and fixing, are all that is required to prepare a proof within the time the patron of the establishment still tarries in the studio.

2.—When handling and developing the paper the same precautions required by sensitive emulsion plates must be necessarily observed, but as the standard sensitiveness of it has been kept purposely below that of an emulsion for negative work, instead of the ruby light, yellow or orange may be used.

3.—The time of exposure varies with the intensity of the negative, and that of the source of light and distance from it. A steady and brilliant artificial light—that of a one-inch petroleum burner or a fish-tail gas jet—is more controllable than the fickle diffused daylight; and after one or two experiments in regard to the distance between plate and light-source, the correct time of exposure is easily ascertained. With a petroleum lamp of the above described luminous force, and at a distance of eighteen or twenty inches from it, a negative of average density requires an exposure of from eight to twelve seconds, but very feeble plates may be printed from by the same light in one or a fraction of a second. When the negative is *very* harsh and dense, diffused daylight should be used, and the print is rather over-exposed, half-tones may be brought out, impossible to obtain from the same negative by any other method of printing.

4.—To control over-exposure some manufacturers of bromide of silver paper resort to restraining with bromide of potassium. But prints restrained in that

manner are rarely of the desired bluish-black tone and brilliant whites; their colour tends toward an olive-green, accompanied by a loss of middle-tints. When over-exposure is suspected we add but a part of the iron solution to that of the potassium oxalate; proceed cautiously and slowly, adding gradually small portions of iron until the process goes on uniformly.

5.—Developer for bromide paper:—No. 1: Natural potassium oxalate, eight ozs.; water, twenty-four ozs.; Oxalic acid, 1 drachm. No. 2: Protosulphate of iron, eight ozs.; water, twenty-four ozs.; sulphuric acid, fifteen minims.

These solutions keep well for an indefinite time, but should be mixed only immediately before use. The iron solution must be added to that of the potassium oxalate, not *vice versa*.

The developer is composed of six volumes of No. 1 and one volume of No. 2. For the development of a five by eight print, about two ounces is sufficient, and the mixture may be made by adding a quarter of an ounce of No. 2 to six quarter ounces, or one and a half ounces of No. 1.

The clearing solution, consisting of two drachms acetic acid No. 8 and twenty ounces of water, or one drachm of citric acid in the same quantity of water, solvent.

The fixing bath: a solution of five ounces of sodium hyposulphite in thirty ounces of water. Immerse the print in this solution, face down, and let it remain there for six or eight minutes, and in absolute contact with the bath.

Mounting Bromide Prints on Glass.

Mounting these prints is a much easier task than with albumen prints, for alpha and bromide have sufficient gelatine on the surface of the paper to provide the necessary adhesive substance. It is only requisite to soak the prints for an hour or so in clean water until the film is thoroughly softened. Lay the prints on the cleaned glass and squeegee all the air-bubbles out from between the paper and the glass. A little gum may be

run round the edge just where the glass and paper meet, and will prevent any tendency to stripping. Allow to dry naturally, and finish as you may desire.

A Handy Wrinkle.

Some trouble will be experienced at times in extricating the paper from the tubes they are sent in, the remedy is a piece of flat elastic band, cotton covered (as sold at any drapers') made to slip over end of roll, thus preventing their clinging to the side of tube.

Another.

If any difficulty is found in distinguishing the emulsion side of bromide or alpha paper, feel the edge of sheet and you will find it turned up slightly on the coated side.

Clouds on Bromide Prints.

Cut out a mask to sky line of picture. Make some marks on paper so that you will be able to superimpose the mask along sky line exactly. Then give the proper exposure for foreground, etc. Replace negative by mask, and cover same with a cloud negative; give one quarter of first exposure, and all will develop together.

To Vignette Bromide Prints.

To vignette bromide prints by gaslight cut an oval aperture in a piece of stiff cardboard, hold the printing frame in left hand, and with right hand gently rotate the card about half an inch in front of the negative.

To Clear Bromide Prints.

In order to remove yellowness from a print upon bromide paper it has been recommended to place the print for an hour or two in a mixture of two parts of a saturated solution of potassium oxalate and one part of water acidulated with acetic acid. This method is said to be successful in clearing prints that have been dry for several months.

Aristotype Process.

Print deeply, and immerse, *without washing*, in the following bath, which may be used at once, and will keep fairly well :—

Hypo.	...	...	...	240	grs.
Sulphocyanide of ammonium	...			50	„
Acetate of soda	...	...		15	„
Chloride of gold	...	...		2	„
Water	...	...	...	3	ozs.

Prints will first turn a sickly yellow, but will gradually assume a brown tone, then purple, and, finally, warm black. Rinse, and give five minutes in a five per cent. solution of alum, then wash well as usual. The above tones and fixes at the same time.

Printing and Colouring on Aristotype Paper.

The surface of aristotype paper is very smooth, and when it is finished by putting on a glass plate it gives a splendid shine just like enamel. The advantage of this print is that it does not fade away like common albumen paper, and for this reason it suits for the purpose of portraits. Recently I tried colouring the aristotype print, and succeeded very well. It will show that it is no comparison with albumen print coloured. The process is not hard, and is about the same as with albumen. Aniline colours are the best to be used. Paint the print as with albumen, the paint is melted with water. To finish the print, it is necessary to put on a glass plate, while it is wet. Therefore care must be taken when wetting the print after coloured, as there is danger to scatter the print and spoil the shade. The best way is, float the print over water, putting the back side down until it absorbed enough water. Then quickly turn the front side down, merely to wet, and put a glass plate coated with thin collodion, and press with squeegee. When pasted on a card, if care be taken not to wet through the surface, the shine is prominent.

Toning Opals.

I find it preferable to start toning the plate with a decided red image, and also to have the fixing done

before, *not* after, toning, as you know then that nearly all, if not all, the reduction has taken place. With toning before fixing there is always a certain amount of uncertainty as to what the resulting tone will be after fixation. Fix first in—water, twenty ounces, hypo., three ounces, for five minutes, wash thoroughly for at least three minutes, and then place plate in following:—Bichloride platinum, one grain; water, ten ounces. The image will gradually lose the red colour and change to a rich purple, and, if allowed time, to black. Toning must not be carried too far, as when dry they seem to be blacker than when wet. Another great advantage is, I find, that if the toning has been carried too far, you can give the same a thorough good wash, and transfer it to the fixing, when it will be as clear and bright as before, and of the same colour as before toning, and is then ready, after a thorough wash, for toning once more.

Blue Opals.

The ordinary gelatine-bromide opals cannot be developed to a dark blue colour, but they may be toned to that shade with gold, or they may be tinted by giving a dip into solution of ferrocyanide of potassium and then solution of iron.

Simple Positive Process.

If ten grains of potassium bromide be dissolved in half an ounce of water, and ten grains of cupric sulphate (blue vitriol) be dissolved in another half ounce, and the two solutions be mixed, a double decomposition takes place, and the solution now contains a mixture of potassic sulphate (some of which crystallises out) and cupric bromide, or bromide of copper. Now, if we take a weak gelatine negative, which has been fixed and washed in the usual manner, and immerse it in this solution of bromide of copper, we shall find it will almost immediately begin to change colour, and after the lapse of a few seconds it will have become a very beautiful and brilliant positive, the high lights being of a pearly yellowish white. It is immaterial to this effect

whether the negative has been previously dried or not ; but if it has been dried, it must be allowed to soak in clean water for five or ten minutes previous to the application of the cupric bromide. If the picture be required as a positive, it may now be rinsed, reared up to dry, and, when dry, varnished with amber varnish and "backed up" in the usual mode.

Black Prints.

Suitable for reproducing drawings, etc.

Gum	...	...	...	385	grs.
Sodium chloride	...	...	...	46	"
Tartaric acid	...	...	...	62	"
Perchloride of iron	...	...	...	123	"
Water	...	...	...	up to	3½ ozs.

Highly sized and smooth paper is evenly coated with this mixture, dried in the dark room, and exposed under the negative ; developed in a saturated solution of ferricyanide of potassium, and fixed in a ten per cent. solution of hydrochloric acid.

Sepia Prints without Silver.

An old number of *La Nature* gives directions for producing photographic prints in sepia tones without using silvered paper. It is simply by sensitising the paper with bichromate of potassium, and coating it with a suitable mixture of sepia and water. A writer in another French paper tried it, and found the process applicable to any other colour—blue, or red, or yellow—of which a suitable inert powder could be obtained, and mixed with water to the consistence found by experiment to be best in the case of the sepia. He got the best effects with negatives having strong contrasts of light and shade ; the half tones were not so satisfactory.

To Blacken Iron Prints.

This is Dr. Lagrange's method of converting a ferroprussiate and citrate of iron print into a black print. He floats the print for a short time upon a weak nitrate of silver bath, which makes it almost entirely

disappear. He then removes the print and washes out all the free nitrate, then brings back the print as a black picture on a white ground by placing it in a bath of ferrous oxalate.

Finishing Blue Prints.

Speaking of blue prints, a very fine effect is had by printing with a wide white margin, by simply providing a larger sheet and using a dense mat all round. If you want a blue margin, after first printing for white expose the margin, having first placed over the picture a block with bevelled edges to protect it. A wide margin print in which the picture has been carefully vignetted, blending gradually with the white surface gives a beautiful result from a good negative.

It is evident that any pattern can be added to the margin. Let the pattern be simple. A delicate line or lace pattern is very effective.



PART VI.

Experiments, &c.

Mirror Portraits.

If ^A NATURE has entertained its readers at sundry times with a description of various modes of executing pieces of photographic drollery. It explains how to produce a picture of apparently a long row of figures from a single subject only. Two mirrors are placed parallel to one another, and separated by little over half a yard. In the space between the two mirrors he places the model to be photographed. Everyone is familiar with the results of figures so placed, as, for example, in a hairdresser's shop, a cafe, or even at home in a room, with mirrors facing one another. The mirrors must be without frames, and one shorter than the other, the camera being placed in advance of the short mirror, and slightly inclined to the floor. The effect is very singular, at least as shewn in the woodcut, and the sitter having in her hands something light and feathery, like a pampas plume, the eye is not offended by any imperfect junction of skirts of the dress. It is evident that these results could be modified in many ways.

Photographic Plate to be Developed in Water.

This relates to photographic plates which may be developed in water instead of a specially prepared bath.

The plates previously covered with emulsion and dried, are coated on the back with developing substance, rendered adhesive and preserved against oxidation by the following process:—

The back of the plate is entirely covered with the following mixture:—

Heated gallic acid, or other suitable reducing substance	10 grammes.
Salicylic acid	1 gramme.
Gum arabic, dextrine, gelatine, collodion, or other varnish-like substance	10 grammes.
Alcohol	... 5 cubic centimetres.
Water	... 20 "

The plates are dried at an ordinary temperature, and the negative is developed by immersing the plate in water containing a small quantity of ammonia.

The proportions of the mixture may vary according to the quality of the emulsion.

The addition of ammonia may be rendered unnecessary by coating one half of the back of the plate with the above-described mixture, and the other half with a liquid obtained by digesting a solution of sugar of twenty-five per cent. with an excess of slaked lime by filtering, and then adding to one hundred cubic centimetres of this liquid fifteen grammes of sugar and twenty-five grammes of gum arabic.

The plates are dried at an ordinary temperature, and the negative is developed by immersing the plate simply in water.

Collodion Positives.

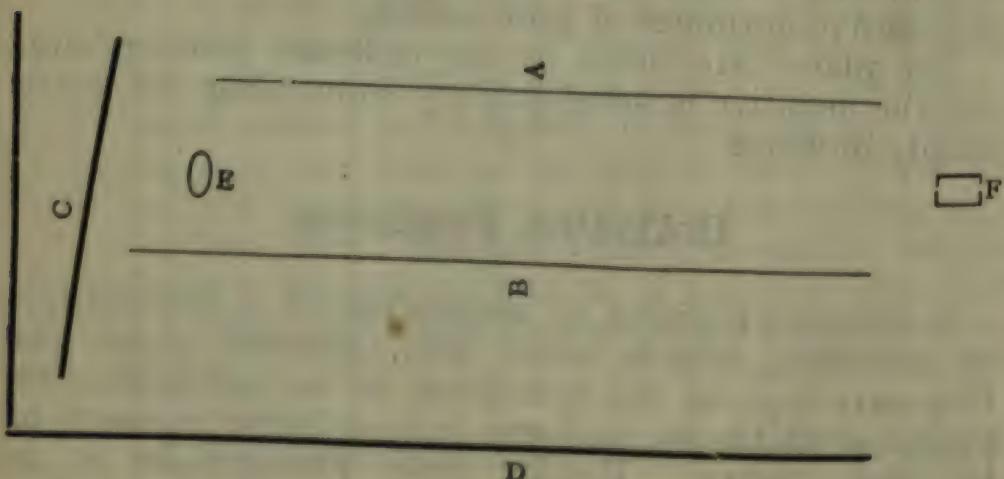
A collodion positive, or ambrotype, is a photograph on collodion, which, when well executed, rivals the Daguerro-type in the pearliness of its half-tones, the vigour of its blacks, and the indescribable delicacy of its high lights. Unlike other photographs it is completed at one operation, or set of operations, during which it need not leave the hands of the artist.

The process may be thus described. A glass plate is

coated with collodion as with a varnish, and it is then immersed for about two minutes in a solution of nitrate of silver. Being now highly sensitive, it is placed in the camera and exposed for one or more seconds, according to the light, and the image thus impressed is developed by the application of a rather weak solution of protosulphate or nitrate of iron. Fixed in either cyanide or hypo., and washed for a minute, the portrait is dried and ready for being placed in a miniature case or other mount, the sitter carrying it away in his or her pocket.

Silhouettes.

This relic of a past age is being revived, and it may be worth our while giving a few hints how to obtain them. The object to be aimed at is, of course, to get the subject lighted from the back only, so that the figure facing the camera is in deep shadow, and the print will, of course, be a black mass with the features, etc., outlined boldly against the light background. Only heads and busts are suitable for this work, as the lower extremities of the human form lack much individuality, even if they were picturesque. The following is the best method of arranging the studio, shown as a ground plan:—



A and B are *dark* backgrounds, B being about four feet away from glass D of studio. C is a *light* back-

ground, set at an angle to catch the light. E the sitter, side face to camera, looking preferably in the direction of D. Focus accurately, short exposure, and develop the image well up. Use a slow plate. A and B are about six feet apart. Top light should be avoided.

Grotesque Photographs.

Take a sacrificed negative—a portrait for example—and if dry, soak it for a moment in water ; then expose it, the gelatine film on top, to a source of heat, in the sun, for example, the gelatine melting under the action of the heat. Make it slide skilfully in any direction of the negative by giving it the proper inclination. You will now see the nose of the patient become longer or shorter at the will of the operator, and the rest of the face will take on very strange expressions. A practised hand will change a profile into a crescent, and a full face into a moon. This artistic operation, properly done, dry the negative and print in the ordinary manner. As is seen the operation is ridiculously simple, and the result positively hideous. We will offer, however, a last recommendation to our readers. Before operating make sure that you can obtain the assistance of two friends as seconds, in case the subject should happen to see your work.

How to Photograph a Bicycle.

The bicycle was brand new and highly polished, so the light was reflected in unsightly patches, and the print was not quite satisfactory. On the next occasion the owner of the machine took it out for a few miles on a dusty road, when the reflecting brightness being dusted over, another plate was exposed, and this time the photograph was a success, every detail showing nicely, and altogether far superior to the first attempt.

To Photograph Flowers.

In setting up flowers to photograph I have found it best to insert the specimens in any suitable receptacle

which will allow freedom of arrangement and assist composition. I usually group them about two or three feet from a window with a steady high light on one side. An imperial sheet of white pasteboard, bent into a half cylinder, and fastened in that position by threads stretched across top and bottom, forms an excellent background. The degree of curvature, distance from flowers, and inclination towards light will regulate the form and intensity of the cast shadows, which will be very beautiful if the arrangement is made carefully. A thin piece of gauze or tissue paper to cover the top of the background will have a useful controlling influence. The greatest difficulty I have found in grouping and illuminating flower groups is to avoid spottiness and secure harmony and breadth of effect.

Seal Engraving by Photography.

Photography now adds seal-engraving to its many accomplishments. A German practitioner of the art gives his patrons the means of sending their portraits in wax to their correspondents, and of affixing their effigy wherever they attach their hand and seal. The process depends upon the property possessed by a mixture of bichromate of potash and gelatine, of becoming insoluble in water when exposed to sun-light. An ordinary portrait is taken of a size proper for a seal, and "printed" on a film of the chromated gelatine; the film is steeped in water, and all the parts not acted upon by the light absorb the fluid and swell up, while those portions that have been acted upon remain intact; thus a gelatine intaglio picture is obtained. To convert this into a seal it is only necessary to take a plaster cast from it, and an electrotype impression from the plaster.

Bust Portraits.

Under the heading of "Recreative Photography," *L'Amateur Photographe* gives some very simple directions for taking portraits *à la* marble busts. Hang up a dead, not shiny, black cloth or velvet to serve as a background,

drape the sitter with a black skirt or wrapper coming as high as the armpits. Powder the whole head, face, and neck with a puff and rice powder. Then place in front of the sitter a piece of cardboard, cut the shape of the outline of the pedestal of a bust, and having the various indentations represented by light and shade, and also the table top on which it is supposed to be standing. The sham pedestal having been pinned in front of the sitter, drape the shoulders and the body as far down as to cover the top of the cardboard pedestal with a piece of white or pale blue stuff, then photograph. A variation is suggested for taking infants or very small children—same background, but the pedestal replaced by large cabbage leaves, real or artificial, arranged so as to give the idea that the child is popping up from the centre of a cabbage. This may be a change from the "Finding of Moses" and the "Old woman that lived in a shoe" portraits of children. For the success of the plan, of course, care must be taken that the shaded side of the sham pedestal and the shadow of the sitter's head are the same. To give the bust the appearance of being in bronze instead of in marble, print a carbon transfer from your negative and transfer it to bronzed or gilt paper.

Photographic Chess Boards.

In trimming or cutting up photographs, we often get spoiled bits that make pretty pictures, but too small for ordinary purposes. Again, too, amateurs get many prints spoiled by stains in parts only. With these it is possible, with a little ingenuity, to make an exceedingly pretty chess and draught board. Thirty-two pictures all the same size are required. This chess board may be made in two ways. A piece of stiff canvas can be marked out into sixty-four equal squares, and the photographs be trimmed to size and mounted on. The whole is then varnished several times to give a good protecting coat, and the board stiffened with wood or tough boards. Or the photographs may be attached to a sheet of glass in the manner described for the opalines, and afterwards mounted in a wooden frame

or made into a table top. The glass method is decidedly the best, for the reason that the constant moving of the chess men will soon wear away the varnish and attack the silver print. The glass, however, affords a strong protection, and prevents the air from attacking the silver prints.

Photo-Micrography.

The lens being removed from a quarter-plate camera, a mahogany cone, blackened inside, and about two inches in depth, is substituted, made to fit tightly into the flange of the camera, and having an opening at the apex through which the tube of the microscope can just pass freely, and only just, and to which an india-rubber band very slightly smaller than the tube of the microscope should be glued, to prevent light entering between the microscope and the cone. The microscope is then placed in a horizontal position, and the eye-piece having been taken out, the tube is passed through the cone and the eye-piece replaced. The object to be photographed, which should be as transparent as possible, is then secured on the stage of the microscope, the manner of doing which, when the stage is vertical, varies with the construction of the microscope. This may be done with two small slips of wood $3\frac{1}{2}$ in. by $\frac{1}{4}$ in. under the stage, one on each side of the opening, and two small india-rubber bands slipped over the ends of both wood and slide. The object can then be focussed on the ground-glass screen, but as the microscope is not specially constructed for the purpose, the chemical and visual foci do not coincide, and the chemical focus must be found by experiment. A few trials, using the fine adjustment, will give the requisite difference between the two foci, which, once found, is constant. A strong light must be employed, but not direct sunlight. The light from a white cloud on a bright day is the best illuminator. No special collodion or developer need be used, beyond being of the best, a necessary point in every photographic operation. The exposure will, of course, vary with the intensity of the light, quality of the lenses of the microscope, sensitveness of the plate, etc.

Crystalline Process.

Those familiar with the working of the carbon process upon glass know the powerful force exerted by the contracting gelatine. It is no unusual thing for a piece of glass, whose surface is rather curved, to be broken to fragments by the gelatinous coating. We have seen the glaze from the interior of a porcelain evaporating basin stripped away in patches, from a similar cause. Whether from photographic experience or not, we cannot say; but it has recently been discovered that the process, hitherto kept a profound secret, for producing the so-called "crystalline glass," is based upon this property of gelatine. The glass is coated with a thick solution of glue, and then placed in racks to dry at a temperature of ninety-five to one hundred degrees. After a while the contractile power becomes exerted, and the portions of the surface are literally torn away by the glue in all manner of fantastic forms and patterns.

An Imitation Snowstorm.

An excellent imitation of a snowstorm might be made by photographing a given locality on an overcast day so that no shadows appeared in the picture, and then, after varnishing the negative, and while it is still tacky, holding the plate in a slanting position and dusting on a very small quantity of some opaque powder from a dredge box or pepper castor. This, if skilfully done, can be made to counterfeit falling snowflakes with wonderful accuracy. White oxide of zinc or powdered blacklead may be used. Those of our readers who are specially interested in portraiture and grouping will find that by combining this dusting-on process with the skilful heaping and piling up of some white powder, such as common salt, and introducing cold-weather articles, as sleds, skates, fur coats, caps, etc., excellent winter effects may be made at any convenient time.

To Make Opalines.

The most effective way of showing photographs is by cementing them to good-quality glass. Done in this manner they are called opalines. The bevelled glass, complete with back sheet and ring, can be purchased, and all that is required is to attach the photograph by first dipping it into a warm solution of gelatine and squeegeeing it on to the glass. Not only can very pretty mantelshelf ornaments be made, but the same method may be used for other purposes. For instance, I have seen a very handsome table-top made by attaching photographs cut in the manner shown. This top was fixed on to an ordinary round deal table, its edges protected with a circular rim, and it formed a tasty and much-admired piece of furniture, costing but little.

Binocular Vision.

The power of the unaided eyes to see the stereoscopic picture as it appears under the lenses of the stereoscope is a valuable possession. In giving directions for acquiring this power it must also be said that it is not free from the risk of making the eyes squint, and that some persons are unable to succeed even after repeated trials. Seat yourself with the two fore-fingers of each hand held squarely before the face at arm's length, and about two inches from each other, the backs of the hands directed outwardly. Fix the eye on some small object on the opposite wall of the room, and it will be seen at once that the eyes will not focus both for the fingers and for the opposite wall, but that where the gaze is directed to the distant object the fingers appear to approach each other so that a single finger is seen with a nail on each outer side. If this can be done without pain or straining, increase the distance between the fingers to three inches. If again successful, take the stereoscopic picture and do the same with it. Three images side by side will then be seen, the middle one possessing the characteristic relief of the picture as seen in the stereoscope.

Lunar and Solar Photography.

Replace the eye-piece of telescope with a light camera (a photo-micrographic camera is best). Use a rapid plate, and about $\frac{1}{2}$ or $\frac{1}{4}$ sec. exposure. Unnecessary to use Optimus lens, unless for magnification of image. For solar photography, a very small diaphragm, very slow plate and very quick shutter.

Moonlight Pictures.

These are taken pointing the camera direct at the sun without including it; these negatives print very well on blue paper.

To Print on Writing Paper.

Float good writing paper on following for five minutes:—

Bichromate of potash...	...	...	1 oz.
Liq. ammon. fort. ·880	...	...	5 drops.
Distilled water ...	...	...	1 oz.

Dry and print. Wash till ground is colourless, and fix in alum solution.

Effluviography.

This name has been applied by M. D. Tomasi to the effects produced by the silent discharge upon a sensitised gelatino-bromide plate. After an exposure of some minutes' duration, an image may be obtained from an electrified body, although (if we understand the author aright) the potential may not be high enough to give any sign of light, and when all other light is excluded, the image may be developed in the usual manner. M. Tomasi considers that the silent discharge produces the same effect as the ultra-violet rays, and may form a connecting link between the two extremes of the spectrum, consisting of what may be called "electric rays."

The Magic Picture.

Take two level pieces of glass (plate-glass is the best), about three inches long and four wide, exactly of

the same size ; lay one on the other, and leave a space between them by pasting a piece of card, or two or three small pieces of thick paper, at each corner.

Join these glasses together at the edges by a composition of lime slaked by exposure to the air, and white of an egg. Cover all the edges of these glasses with parchment or bladder, except at one end, which is to be left open to admit the following composition :—

Dissolve by a slow fire, six ounces of hog's lard, with half an ounce of white wax ; to which you may add half an ounce of clear linseed oil.

This must be poured, in its liquid state, and before a fire, between the glasses, by the space left in the sides, and which you are then to close up. Wipe the glasses clean, and hold them before the fire, to see that the composition will not run out at any part.

Then fasten with gum a picture or print, painted on very thin paper, with its face to one of the glasses, and if you like, you may fix the whole in a frame.

While the mixture between the glasses is cold, the picture will be quite concealed, but become transparent when held to the fire ; and as the composition cools, it will gradually disappear.

German Weather Pictures.

These pictures consists of a coarse wood-cut, generally representing sky, mountain, and water below, fixed on glass, and rendered transparent by varnish. The back of it is coated with salts of cobalt, which turns the picture to bright blue in the upper part, and the lower to green, in fine weather, while before rain the sky becomes grey, and the remainder a reddish brown. A pretty photograph on glass, in the place of the very common woodcut, would greatly enhance its beauty.

Photscopy.

Dr. Andresen gives in the *German Amateur Photographes* a new process of industrial reproduction, giving results that are really æsthetic. Take ordinary photographic paper, or good drawing paper, and sensitise in the following bath :—

A.—Ammoniacal citrate of iron	10 grammes.
Water	... 60 c. c.
B.—Red prussiate of potash	12 grammes.
Water	... 100 c. c.

Mix equal portions of the two solutions a few moments before using (the mixture does not keep well). Pour into a dish and float the paper for about two minutes. These manipulations should be made in the dark room. When the paper is dry expose under a negative. The development is made in pure water, which should be changed several times. If the printing has been sufficiently pushed, the prints obtained are full of detail and are almost as sharp as those on albumenised paper.

Green-Glass Printing.

Print under dark-green glass (in direct sunlight, if possible) until the details in the shadows are all but lost and the details in the high lights fully out. With thick negatives various details should be out in the densest parts. If pure black tones are aimed at, use the following toning bath:—

Borax	...	...	...	...	1½	drams.
Uranium nitrate	...	...	...	...	4	grains.
Gold...	...	...	...	...	3	"
Water...	...	...	...	...	24	ozs.

The aforesaid instructions are for both matt surface and albumenised paper, only the matt paper should be printed rather deeper than the albumenised paper, as it reduces slightly more in the toning bath.

New Camera Lucida.

Take a piece of looking-glass; rest it on a table in any angle in front of the object to be copied; then having a piece of paper placed behind the mirror, by looking into it from the upper part of the glass, with one eye, and with the other making the axis of vision meet in the focus point of both, any object may be seen and sketched with singular beauty and accuracy.

Sham Instantaneous Portraits.

I lace your subject dressed in light-coloured clothes in front of a dark background, or one representing the entrance to a cavern, etc., or the actual entrance to a cellar, in the position of a juggler catching a ball or other object, and suspend above and around him by black threads, knives, plates, oranges, etc., previously whitened with chalk. A game at battledore and shuttlecock, tennis, etc., or a boy flying a kite, might be managed in the same way.

Photographing Money.

Pieces of money, medals, cameos, and any small objects in relief, can best be photographed if they are illuminated by the light of a good lamp or by gas, and the photograph has better plasticity than if done in the studio, where it is difficult to close the light off.

Photographing Gravestones.

This would seem to be about the simplest form of photography. Two things, however, might be noted. The lens should be well stopped down to secure sharp definition, and in the case of tablets the plate should be accurately parallel to the tablet to secure squareness. N.B.—Swing-back should be used if necessary.

To Imitate Stone.

If you wish your balustrade to resemble rough stone, procure some sheets of cotton wool (*i.e.* wadding), lay this evenly over the woodwork, and then apply with a brush, over the whole, a mixture of raw starch, dissolved glue, or gum, and water, to about the consistency of whitewash, and allow to dry. Then apply oil paint according to colour of stone required, yellow ochre being a good base to work other colours on, such as touches of brown, white, green, etc.; all depends on the stone you wish to imitate, and while the paint is still wet, sift some sand or fine earth over the whole, to give a granular appearance, and dry.

To Mount Pictures on Metal.

Paper pasted, gummed, or glued on to metal, especially if it has a bright surface, usually comes off on the slightest provocation, leaving the adhesive material on the back of the paper, with a surface, bright and slippery as ice. The cheaper description of clock dials are printed on paper and then stuck on zinc, but for years the difficulty was to get the paper and metal to adhere. It is, however, said to be now overcome by dipping the metal into a strong and hot solution of washing soda, afterwards scrubbing perfectly dry with a clean rag. Onion juice is then applied to the surface of the metal, and the label pasted and fixed in the ordinary way. It is said to be almost impossible to separate paper and metal thus joined. Probably metal show tablets might be successfully treated in the same manner.

To lay Prints on the Inside of Glass Globes.

First, cut away all the white part of the impression, so that nothing appears but the print; then brush over the face side of it with strong gum water, or size; then put it into the globe, and with a long small stick, on which a camel's hair pencil is fixed, stick it even on, and arrange what number of prints you please in the globe; let them dry about twelve hours, then pour some prepared plaster of Paris, either white or tinged, with any colour you please, and turn the globe easily about, so that every part may be covered; pour out the superfluous plaster, and it is finished.

Filtering Mercury for Barometer.

Apropos of the fitting up of a home-made barometer, it may be pointed out that the purity of the mercury is a matter of some consequence, if only in the separation of undissolved impurities. There are two common modes of filtering mercury; one consists in pressing it through wash-leather and the other in allowing it to run

through a very small aperture. The latter is the simpler, and is carried out by folding a small piece of writing paper just as an ordinary porous filter; but for the mercury purification it is necessary to pierce a small hole by passing a fine needle through the apex of the cone. If mercury be then placed therein, it will run slowly through the minute hole and emerge quite brilliant and free from scum.



PART VII.

lights for the lanternist.

Lantern Slides on Ilford Plates.

WITH *ordinary* Ilford plates (exposure to ordinary gas burner two to three feet distant, say five to ten secs.) very clear transparencies are to be got, which after clearing (alum and acid bath) give on intensification with mercury and ammonia, very fine brown and sepia tones. Thomas's lantern plates are also very reliable.

Lantern Slides by the Carbon Process.

The carbon process is one which is particularly applicable for the making of lantern transparencies, for they are easily made and vigorous when finished. Carbon tissue, which consists of gelatine mixed with a pigment, may be obtained, ready prepared, from the Autotype Company, London. It is made in a variety of colours, but perhaps the purple-black will be found to be as pretty as any for lantern slides.

The tissue is sensitised in a solution of bichromate of potash—saturated solution, to which is added an equal part of water. After being dried, it is ready for exposure.

The negative, which is to be printed from, must be provided with what is termed a safe edge ; this being a mask of opaque paper, such as an ordinary slide mat. The negative is now ready to be printed from, by placing the sensitised tissue in close contact with it, and exposing to the light ; but, as it is impossible to see the picture until after development, the correct exposure must be determined by experience.

The tissue is, after exposure, placed in water, together with a lantern-slide plate, which is to form the support for the picture ; in a short time the tissue will have become limp and pliable, and can be placed face down upon the glass, and a squeegee run over the surface to ensure the contact of the tissue and glass. It is then put under pressure for fifteen or twenty minutes.

The development is effected by placing the tissue and support into hot water, which causes the gelatine to exude between the paper of the tissue and the glass. At this stage the paper may be peeled off the glass, leaving the gelatinous mass behind. The action of the water dissolves away those parts of the gelatine which have, by the gradations of the negative, been unaffected by the light, whilst those portions upon which the light has acted are now insoluble, owing to the bichromate of potash with which it was sensitised. After development the plate is rinsed in cold water, dried, mounted, and is ready for use.

The high lights will be found to be bare glass, and in mounting the slide it must be remembered that the image is reversed, and the marks for the lanternist's guide must be put on accordingly.

Blue Lantern Slides.

Take one ounce of fine gelatine, put it in clean water wash it a couple of times, squeeze out the water and place it on a clean towel. After about one hour dissolve the gelatine in twenty ounces of hot water, and filter. Coat plates carefully freed from grease with the gelatine solution warmed in 110 to 140 degrees Fah., lay on a clean marble slab placed horizontally, and as soon as the coating has become stiff enough not to run any

more, set up on nails to dry. To make the sensitizing solution, dissolve citrate of iron and ammonia, $7\frac{1}{2}$ drams, in 4 ounces of water, also ferri-cyanide of potassium, 5 drams in 4 ounces of water. Mix and filter into a dish and immerse plates for about five minutes, avoiding air bubbles, when they are printed, about double the time required for albumen paper. The last thing to be done is washing, which removes the salts and develops a rich blue tint.

A Cheap Way of Producing Lantern Slides.

Choose a negative that has plenty of detail, and one that has been nicely exposed and properly developed, and take a print on white albumenised paper; after which, thoroughly wash, tone, fix, and wash again, and mount on a chemically clean lantern glass, face downwards, with freshly-made starch paste. Well rub down, and see that there are no air-bubbles between the print and glass; stand up to get thoroughly dry, after which proceed to lightly rub away all the paper with fine glass paper until you come down to the albumen; well dust, and give a good warming over a gas flame, and coat with transparent varnish; clean and polish a lantern backing plate; insert a round mask between the two, and if all has been kept nice and clean the results will surprise you. They can also be tinted or coloured before varnishing.

An Instructive Novelty in Lantern Slides.

Arrange two pendulums of equal length and weight to work or swing on a frame. To the top of each affix two glass rods meeting at a point, thus:—At the apex fix an ordinary sewing needle, which, when in action, is to rest on a smoked plate of glass. Illuminate all this by means of a lime-light lantern in a darkened room, the rays from which be made to pass through a compound lens of eight-inch focus, and, by means of a small mirror, reflected on the opposite wall, which should be flattered of a salmon colour.

Set the pendulums or rods swinging, and, when doing so evenly, lower the needle point on to the smoked plate of glass, when will be seen portrayed the various tones in music—firsts, thirds, fifths, and unison—all different figures, some very beautiful, according to the rate at which the rods swing.

Clearing Lantern Transparencies.

The following course has answered well in our hands, and appears free from fault, practical or theoretical. After development (and, of course, washing) if the negative require the alum bath, let it be *chrome* alum, instead of common alum, of, say, ten or fifteen grains to the ounce. After this bath, wash well, or at any rate moderately well, and pass the plate through very dilute ammonia before fixing. After fixing, wash again very thoroughly, and if there be signs of frilling, re-apply the chrome alum. The latter is better and safer than ordinary alum because it contains no alumina to be precipitated on the film to cause opalescence; it may be used in conjunction with an acid, just as ordinary alum is, and always permits with safety the use of an alkaline bath to prepare the film for the hypo.

After fixing and thorough washing, finished off again with a dip into dilute alkali, the plate is finally passed through a very dilute solution of *aqua regia* or nitro-hydrochloric acid, made by mixing one part of nitric with two parts of hydrochloric acid, and diluting one ounce of the mixture with forty ounces of water, or more. This acts far more favourably than hydrochloric acid, causing a visible formation of silver chloride in the lighter shades of the picture; consequently, it is only necessary to watch carefully until the fog or veil is converted into chloride, then to wash and treat once more with hypo., or other fixing agent, to produce a perfectly clean picture.

Toning Lantern Slides.

For the ordinary transparency plates, produce a weak, thin slide; after fixing and washing well, bleach the image with mercuric chloride; again wash well, tone with

Hot distilled water	...	...	8 ozs.
Sulphocyanide of ammonium	...	...	30 grs.
Carbonate of soda	...	...	3 "
Saturated solution of hypo.	...	...	1 minim.
When tepid, add			
Distilled water	...	...	2 ozs.
Gold	...	...	4 grs.

To Produce Warm Tones.

Warm tones are to be obtained by giving two or three times the exposure necessary for black tones, and by modifying the developer proportionately.

Clouds on Lantern Slides.

May be most easily done by printing the clouds on another lantern plate, developing, fixing, etc., and using this cloud positive as a covering glass; otherwise combination printing has to be resorted to, a weak mask being used to cover over either sky or landscape when exposing the second time.

A Useful Slide-making Dodge.

In printing lantern-slides by contact it is well to obviate the creeping action of light by the use of a mask of thin black paper between the negative and the lantern-plate, otherwise marks may arise on the slide round the edges. This will be specially noticeable when using a thin negative.

Cutting Lantern-slide Mats.

To cut lantern-slide mats neatly, quickly and accurately, make a form the shape and size of the opening required, of thin sheet brass. Bend it in the middle until the two sides almost meet. To use it, double the paper to be used in the middle and insert between the leaves of the brass form. Holding the form between the thumb and forefinger firmly, cut around with a pair of scissors.

Card-board Slide Carriers.

It sometimes happens that extra carriers are wanted for some particular sized plate, or for a copying camera, or as mounts for lantern slides. All the materials required are some good cardboard, a glue-pot, and some pieces of common talc. One piece of cord is cut to nicely fit the dark slide or lantern slide; then an opening, the size of the plate or slide to be used; another card is cut the same outside, but one-eighth of an inch smaller inside; then at the corners are fixed strips of talc. When ready, the talc strips are glued on and the top card put in place, having previously been glued with thin glue. When slightly set, it is best to put the whole under pressure in a press, or under a heavy weight. The use of the talc is, the carrier remains stiff and in shape for years, and does not easily bend.

A Hint.

For home work, there is nothing more convenient than the blow-through jet; using the coal gas direct from the nearest gas burner, and oxygen from a cylinder. The only limes which (in my experience) will last for more than one evening are the hard "Nottingham."

Dissolvers for Single Lanterns.

It is generally admitted that in using a single lantern and a plain ordinary carrier, the effect upon the screen in changing the slides is very unsightly, and very far from pleasing. Dissolving views produced by the use of two lanterns are very pleasing, but every one has not a pair of lanterns, and some object to attend to two lights. Hence, to get this effect, a great number of dissolvers have been contrived and adapted to the single lantern.

Many of these are very good, and indeed perfect, but I think deficient in one point. I am aware that in all the different forms of these dissolvers, the effect is produced by gradually shutting off the light, and, in the short interval of darkness, changing the slide. But I

think the illusion would be more complete, and the effect more pleasing, if all this could be effected without cutting off the light.

I propose to effect this end by using a ground-glass screen in front of the lens (not behind it). As the ground-glass screen comes in front of the lens, the picture fades away, either quickly or slowly at the option of the operator; the slide is imperceptibly changed, and the new picture gradually appears on the screen, which is fully lighted during the whole of the operation. As the effect is the same whether the ground-glass screen moves horizontally, vertically, or in a circular direction, it can be adapted and utilised with any form of automatic carrier, and those who cannot get one of the improved and expensive carriers can fix the screen in front of their lens and work it separately (with a little extra trouble, of course).

Lantern Condenser Protectors.

With the increased pressure of gas as supplied from the steel gas cylinder when using the oxy-hydrogen light, the lime cylinder is very apt to be a source of danger to the condenser, for if it is not constantly turned it becomes pitted, and the flame playing on the uneven surface of the hole thus made in the lime is very apt to fly back at an angle and crack the back lens of the condenser. The great heat also of a paraffin multiplex wick lamp is also very likely to cause undue expansion of the condenser, and without the lens is loose in its cell it is liable to fly.

A simple protection is afforded by having a piece of good and flat glass free from flaws fitted into a brass or tin mount of the shape of a canister cover, and of a size that will just slide over the cell of the back lens. If this glass breaks, it is a simple and inexpensive matter to replace, for two or three glasses should be in reserve as part of his lantern kit. The brass mount can be most readily taken apart if a screw ring is used to secure the flat glass, but other means of fixing can be devised to suit the particular apparatus. This plan of protecting condensers may not be novel, but as so many

lantern condensers are not provided with protectors, it will be as well to take precautions before the damage occurs, which sooner or later it is almost sure to do.

Substitutes for Lime.

Marble makes an excellent substitute for lime with the oxy-hydrogen light, being made easily incandescent and giving out a strong powerful light.

Another good substitute for lime is said to be alabaster, some lanternists even preferring it to the lime cylinder. It has one great advantage over the marble, viz., that it may be much more easily cut into the required shape; but as regards the difference in quality of light obtainable by the two I am unable to speak; however, it may prove an interesting experiment for those readers who think it of sufficient interest.

To Make Oxygen Gas.

Oxygen gas should be made in a safety retort. That with the simple cork I find the best and safest. The retort should be washed out after use while still warm, and left inverted till thoroughly dried. When charged with the chlorate of potash mixture (avoid the cheap German chlorate, and take one-sixth as the proportion of manganese of chlorate), place the retort over a clear fire, or, better still, a gas stove. The tube from the retort must be connected with that arm of the purifier which dips below the water; a minute or two after ebullition commences test for oxygen in the usual way (with smouldering paper). Glass purifiers or coolers are to be preferred to those made of tin, as the operator is able to see at what rate the gas is coming over, also to note the quantity of water in the purifying bottle, which should not be more than half full. Twenty-five or thirty minutes is about the time required in making gas for one entertainment.

Re Limes.

With compressed gas it is more than ever necessary to well warm them before subjecting them to the full

force of the combined gases, hence it is a good plan to first warm them with the hydrogen flame only of jet, and then with just a *little* oxygen mixed with it.

Reducing Smell.

To reduce smell to minimum, the following rules should be observed. In the first place use the very best oil that can be bought. The next rule is always to empty out any unused oil that may be in the lamp as soon as the lamp has cooled after use. Much of the smell is owing to a thin film of oil which always spreads over the top of the reservoir of the lamp if any oil is left in it. The heat inside the lantern evaporates this oil and causes a good deal of smell. But even this precaution is not sufficient. There will still be a little oil on the top of the reservoir. I have succeeded in dealing with this difficulty in a manner as satisfactory as I believe to be novel. I sprinkle the top of the reservoir with camphorated chalk which takes up any oil which would otherwise lie on the metal and the camphor in the chalk seems to have the effect of deodorizing the oil. The camphorated chalk, of course, has to be renewed from time to time. To prevent as far as possible any oil working down from the wicks, these latter, after the lamp has been put out, should be turned as low as they can be without danger of slipping past the cogwheels by which they are adjusted. In trimming the lamp care should be taken that none of the charred wick is allowed to fall and clog up the air holes, and it will often be found an improvement to enlarge these same air holes a little by means of a good sized bradawl or other suitable pointed instrument. Once a year two important events should happen in the history of every optical lantern lamp. It should have new wicks however much of the old ones remain, and it should be most thoroughly washed—both the body of the lamp and the chimney. First it should be boiled in soapy water and a little soda for a quarter of an hour, then it should be brushed (an old tooth brush is useful for this purpose), and lastly it should be rinsed and wiped dry, the inside of the cone and the chimney being particularly well rubbed.

A Cheap Screen.

Some one a few years back recommended the use of white drawing paper as a screen. I have tried it, and can emphasise the recommendation. My own screen for parlour use is made of continuous cartridge paper, two yards square, and is mounted on a wooden roller. It answers better than the whitest of linen, and is ready for use at a moment's notice. It has, further, the advantage of being very cheap, and is easily replaced if damaged.

Lessening Noise in Removing Slides.

It is very annoying during a lantern exhibition to hear the loud click of the spring in the holder-stage, caused by the withdrawal of the slide-holder each time the holder is drawn out in order to put a fresh slide in the lantern. Sliding holders are to be had in which a frame travels backwards and forwards, and that is a convenient arrangement where only a series of slides are to be shown all of one size; but when chromotropes, slipping slides, levers, &c., are shown, the noise caused by the springs becomes very unpleasant indeed.

I avoid this unpleasant noise by removing the spring plate from the lantern altogether, and using instead a couple of small upright brass rods, covered by a piece of india-rubber tubing, the rods working in eyelet holes, top and bottom. From a few experiments I have made, I believe it would be far better than the springs now in use.

To Exhibit Pictures from a Window.

If you desire to show the picture to a passing crowd, get a frame made with sheet stretched thereon, to take place of both sashes which you remove. Then project the picture from a lantern that rests on a table within the room.

Inverting the Image on the Screen.

Let us suppose that one is showing on the screen that simple, beautiful, and effective tank experiment,

the decomposition of the water by electric agency, or even by the insertion of a piece of zinc or other wire into a tank of acidulated water, sufficiently strong to cause it to slowly dissolve. The gaseous bubbles will in either case rise to the surface of the liquid, but on the screen they will appear to fall downwards and convey an erroneous impression. In ordinary picture projection this is remedied by placing the slide in the lantern in an inverted position, an expedient that is obviously out of the question when dealing with a tank full of fluid. For this reason an optical expedient must be had recourse to in order to the complete re-inversion being effected between the object and the screen.

A rectangular prism placed in front of the objective or projecting lens of the lantern, with its hypothenuse or reflecting surface just below but parallel to the axis of the lens fulfils the required condition ; the rays which are to form the image upon emerging from the lens are caught by the prism and quite inverted, forming on the screen a non-inverted picture of the original.

The Lantern Tank.

Various interesting experiments may be shown by means of a tank. To make one, select two pieces of wood, eight inches long, four inches wide, and five-sixteenths of an inch ; and at the middle of each cut a hole three inches in diameter ; after which cut away the wood surrounding this hole for a distance of about a quarter of an inch, so that the borders of the first-mentioned one will form a shoulder for the part afterwards cut away, the larger aperture being cut to the edge of the piece of wood in such a way that when the two slabs of wood are fastened together, a tank without sides is formed. Two pieces of glass are cut, of a size that will just admit of their being dropped into position ; these are kept distended by means of the insertion of a piece of india-rubber tubing, bent horse-shoe form, which, while keeping them distended, forms at the same time a water-tight compartment.

Transmutation of Colours.

Place into the tank a solution of blue cabbage, and by means of the pipette add a few drops of diluted sulphuric acid ; the blue colour will gradually change to red. If a little ammonia be added the colour will again be changed to blue. If more alkali be added, the solution, when stirred, will present a green appearance, and if a little acid is again added to this, and the solution stirred, it will at first become blue, and finally red.

Another Method.

Partly fill the tank with water slightly coloured with tincture of blue cabbage ; to this slowly add a small quantity of liquid ammonia, in such a manner as to mix it ; then, by inserting the jet of the pipette to the bottom of the tank, add a small quantity of sulphuric acid. The effect upon the screen will be green at the bottom, purple in the middle, and crimson at the top. If the solution be stirred slightly the colour will become red, green, or blue, according to the predominance of one or the other solutions. If to this a little liquid chlorine is added, the solution will become clear.

Another.

Place in the tank a very weak solution of nitrate of copper ; this will appear quite clear, but upon the addition of one or two drops of ammonia it will strike a deep blue colour. The addition of nitric acid will immediately cause the colour to disappear.

The Shower of Bullets.

The appearance of a shower of bullets may be presented upon the screen if the tank is filled with dilute sulphuric acid, and a small piece of zinc dropped into it. The generation of the bubbles of hydrogen will, upon the screen, appear as bullets of various sizes.

Streamer.

Beautiful streamers may be produced upon the screen if a crystal of oxalic acid is suspended in the tank containing hard water.

The Volcano.

An attractive subject on the screen is a volcanic mountain, from which volumes of smoke are apparently emitted. This is done by filling the tank with water, and suspending in it a piece of zinc, shaped to represent a mountain, the top of which must hang downwards. Previously to placing the zinc in position, a piece of piping, with a small outlet, must be soldered down the side of the zinc mountain, its orifice being at the summit.

In order to cause the smoke to appear it is only necessary to place a drop or two of ink in the tubing, when the appearance of a volcano in full play will be presented. A crystal of permanganate of potash dropped into the tube will also produce the effect of smoke, and it possesses the advantage of being longer in duration.

The Electric Tree.

Many pretty effects may be produced upon the screen by the aid of a small battery in conjunction with the tank. The electrodes should be made of very thin platinum. Fill the tank with a solution of acetate of lead, and place the two wires from the battery down each side of the tank. As soon as a weak current of electricity is passed, a leaden tree will form at one of the poles, and gradually lengthen out towards the other pole.

Electric Transmutation.

Having filled the tank with a solution of sulphate of soda, coloured with an infusion of red cabbage, which imparts a purple colouration, divide the tank into three vertical compartments, by pushing into it two pieces of porous cardboard. Now pass an electric current

through the solution, as in the last-mentioned experiment, the two wires being in the outer divisions. The acid discharged from the one pole changes the colour of that division to red, while the alkali from the other pole will cause the production of a bright green colour. When the current is reversed the colour will gradually change places, that in the centre division remaining of the original purple colour.

The Optical Fountain.

Take a frame of brass, of the same size and thickness as a magic lantern slider, and introduce a number of pieces of twisted glass, so that they may all be made to revolve in conjunction by turning a handle provided for the purpose. If the frame be now introduced into the lantern, and a painted plate of glass representing a fountain be placed in the front, it will be found, that when the twisted glass is turned, streams of water will appear to ascend on the screen in the most perfect way possible.

The Storm at Sea.

Provide two strips of glass, whose frames are thin enough to admit both strips freely into the grooves of the lantern. On one of these glasses paint the appearance of sea from a smooth calm to a violent storm. Let these representations run gradually into each other, as in the figure; and you will of course observe that the more natural and picturesque the painting is, the more natural will be the reflection.

On the other glass, paint various vessels on the ocean, observing to let them end where the storm is, to appear in a state of violent commotion, and the vessels as if raised on the waves in an unsettled position, with heavy clouds about them.

You then pass the glasses slowly through the groove and when you come to that part where the storm is supposed to begin, move them gently up and down, which will give the appearance of the sea and vessels being agitated; increase the motion till they come to the height of the storm. You will thus have a very

natural representation of the sea and ships in a calm and storm ; and as you gradually draw the glasses back, the tempest will subside, the sky appear clear, and the vessels glide gently over the waves.

The Spectre.

Enclose a small magic lantern in a box large enough to contain a small swing dressing-glass, which will reflect the light thrown upon it by the lantern in such a way, that it will pass out at the aperture made at the top of the box, which aperture should be oval, and of a size adapted to the cone of the light to pass through it. There should be a flap with hinges, to cover the opening, that the inside of the box may not be seen.

There must be holes in that part of the box which is over the lantern, to let the smoke out : and over this must be placed a chafing-dish of an oblong figure, large enough to hold several lighted coals. This chafing-dish, for the better carrying on the deception, may be inclosed in a painted tin box, about a foot high, with a hole at top, and should stand on four feet, to let the smoke from the lantern escape.

There must also be a glass planned to rise up and down in a grove, and so managed by a cord and pulley that it may be raised up and down by a cord coming through the outside of the box. On this glass, the spectre, (or any other figure you please), must be painted in a contracted or squat form, as the figure will reflect a greater length than it is drawn.

When you have lighted the lamp in the lantern, and placed the mirror in the proper direction, put the box on a table, and setting the chafing-dish in it, throw some incense, in powder, on the coals. You then open the trap-door, and let down the glass in the grove slowly, and when you perceive the smoke diminish, draw up the glass that the figure may disappear, and shut the trap-door.

This exhibition will afford a deal of wonder ; but observe, that all the lights in the room must be extinguished ; and the box should be placed on a high table, that the aperture through which the light comes out may be seen.

PART VIII.

Miscellaneous.

Photographic Wastes and how to Save them.

*Paper Clippings, all Untoned or Over-Exposed Prints,
Blotters, Filters, &c.*

SHOULD be introduced by degrees into an ordinary stove and burned to ashes in the most thorough manner. It is important that the ashes be not withdrawn from the stove until the whole of the carbonaceous portion of the paper is entirely consumed. The paper should be kept free from admixture with tintype clippings, glass, nails, and other extraneous matter, which is a positive injury to the waste. Before burning see that the draught is completely shut off, otherwise much loss of silver will be occasioned.

Print Washings, and Old Positive and Negative Baths.

To save the above wastes, in the easiest and most economical matter, procure a good sound cask, of dimensions suitable to your needs, loosen the top hoops in order to remove the head, and replace hoops tightly. Next have a hole bored through the side of the cask, about seven or eight inches from the bottom, into this insert a wooden faucet and the barrel is ready to receive the waste solutions referred to. To precipitate the silver from these, proceed as follows:—Make a saturated solution of common salt, and add same to the liquid in

barrel ; the precipitate which forms is chloride of silver. An ounce of common sulphuric acid, added occasionally, acts beneficially, keeping the solution in an acid condition. Should the liquid, after standing twenty-four hours, refuse to clear up, a wine glass full of a saturated solution of common alum or proto-sulphate of iron will bring about the desired result. When the precipitate has subsided, the waste water can be drawn off by the faucet and thrown away.

Fixing Solutions from Prints and Dry Plates, and Cyanide Solutions from Tin-Types.

These should be introduced into a barrel similar in every respect to that above referred to. Instead of salt, however, the savoury compound known as *sulphuret of potassium* must be dissolved and added so long as it forms a precipitate. The latter is of a very dark colour and in this case is termed *sulphide of silver*. Should this solution also refuse to clear up after standing twenty-four hours, add solution of proto-sulphate of iron or alum as already suggested above. In these, and indeed all waste solutions, large stoneware crocks may be advantageously substituted for barrels, should the volume of waste not be too large.

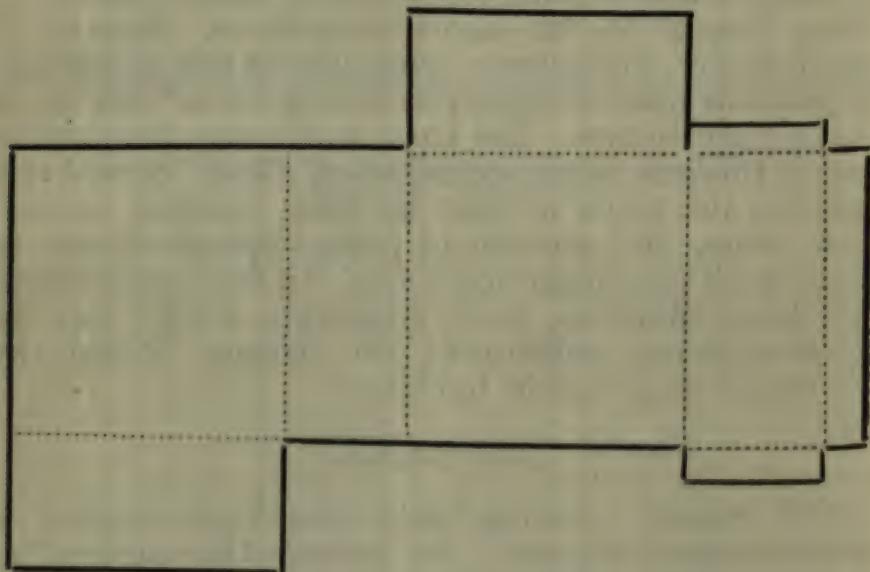
Gold Solutions.

Old "spent" toning baths sometimes contain a small amount of gold. To recover this proceed as follows :—Pour all these solutions into a stoneware crock ; next add an ounce or two of common sulphuric acid, and finally, also, a strong solution of freshly dissolved proto-sulphate of iron. The precipitate will soon subside, and in time form a brownish-black deposit at the bottom of the vessel. The deposits, also, which invariably form while the toning bath is being neutralised by carbonate of soda or other alkali, should be saved and thrown into the crock.

A Home-made Camera Case.

I first pack together on a table the camera and backs arranged with reference to each other, in the same

position as that which I intend them to occupy in the case, so that I can obtain by measurement the necessary length, breadth, and depth of the case. I then procure a sheet of millboard, whose length is rather more than twice the depth and breadth of the case added together, and whose breath is not less than the length of the case added to twice its breadth; thus for a case 8 in. deep, 9 in. long, and 4 in. broad, a sheet not less than 26 in. by 17 in. would be required. On it I then pencil out the outline given in the diagram (which being drawn to scale will sufficiently explain



itself), taking especial care to get all the right angles true. I then cut completely through the board along the continuous lines, and cut half through the thickness of the board along the dotted lines. This will allow the board to be bent along the dotted lines into the form of the case and its lid. I then get someone to hold it while I glue strips of calico or cloth along the junctions, and then glue strips of the same kind along the other edges. When the glue is hard the case is usable, but its appearance will be improved if it is covered. This may be done with waterproof material, or with bookbinders' cloth. It is hardly necessary to

give a drawing to show the manner in which this should be cut; the thing to be aimed at is to so cut it that the joins should, as far as possible, be in inconspicuous places, and to allow of the edges being turned in over the edges of the millboard. The lid, if preferred, may be made entirely separate.

All that is now required is some means of carrying the case. An ordinary double rug strap and handle will answer the purpose well if it is to be carried in the hand, but, if preferred, straps can be easily arranged so that it may be carried on the back as a knapsack or slung over one shoulder.

A Show Case Item.

In fitting up a frame with a number of small pictures, which, it is desired, shall be arranged in some sort of design, the following little wrinkle may be found of use:—

Mark out the backboard, upon which the specimens are to be pinned, into a series of rectangular openings, by means of threads crossing it from top to bottom, and from side to side, and fastened to its edges with tacks.

These lines are of use in determining the exact positions the pictures are to occupy, and the last cabinet or carte being fastened down, they are quite easily removed without in any way disturbing the work in hand.

A Mountant that will Keep.

Just *damp* half an ounce of best starch with cold water, then with a stirrer get rid of all lumps, and do not proceed further until all has been made into a thick paste. Have some boiling water ready and turn into the starch, whilst boiling, one ounce or so of hot water, well stir, and notice if the starch has begun to clarify; if so, all is well. Then add two or three ounces more boiling water, according to consistency required, stir well. When considerably cooled down, add one drachm methylated spirit and four drops carbolic acid, well stir, and set aside till wanted.

Preparing Paintings for Copying.

Before photographing a painting, its peculiarities should be examined, especially in the matter whether it is or is not varnished ; but in either case it will often be found that particular colours in it have a matt appearance, known as *embu*. These embus may be rendered harmless by passing over the painting a sponge or brush charged with the albumen of an egg which has been beaten into a froth, and then allowed to repose ; two or three drops of ammonia should be added, to impart keeping qualities. With very old pictures the same result may be obtained by rubbing them lightly with a flannel upon which one drop of the finest salad oil has been allowed to fall ; the opposite side of the piece of flannel to that on which the drop of oil falls is the side which should be applied to the painting.

Handy Trays.

Get some good wood and nail the pieces together to make the tray the size you wish. Then take some oil table cloth, fasten it to the tops of the sides by means of tacks. This kind of tray fully answers the purpose of the more expensive trays for washing, toning, and fixing prints, etc.

Large Trays for Enlargements.

First, make substantial wood trays of the required size. Screwing them together is better than nailing. See the trays are closely jointed, and that the wood is sufficiently strong ; $\frac{1}{2}$ in. finished pine or deal will do for trays 4 ft. by 3 ft.

Then get ordinary oil-cloth, of the white marble kind used for covering ordinary toilet stands, and glue this inside the trays—of course, woolly side next the wood—and don't cut the corners, but fold them in, the way the Willesden paper trays are done. There must be no joining the cloth. Let the edges of the cloth lap over the outside of the end and sides of the trays, fastening them there with a row of common tacks.

To Make a Spirit Level.

A very convenient and flat spirit level, suitable for sinking in the top of a camera, may be made by hollowing a round piece of brass, the size of a penny, and twice its thickness, and cementing to it, as a cover, a circular concave lens, such as are sold for spectacle glasses, of the very slightest degree of concavity. The spirit is then introduced through a hole at the back, which is afterwards closed by means of a screw, under the shoulder of which a little white lead is placed. Enough spirit must be introduced to allow a quantity of air, the bulk of a pea, remaining inside. If this has been properly made, it will act the part of an effective spirit level and will last for years.

Packing Bottles.

To save time in packing bottles take ordinary cotton batting of a width corresponding to the height of the bottles and cut it off the right length to reach around them. Wrap the cotton around the bottles and outside of that roll a piece of strawboard or pliable pasteboard. Wind with string, using a slip-knot to draw up tight so that the sheath cannot slip off the bottle. Get a box just large enough to hold the bottles crowded close together. They can be thus packed in much less time and space than is possible in any other way.

A Simple Barometer.

Take a common phial bottle, and cut off the rim and part of the neck. This may be done by a piece of string, or rather whipcord, twisted round it, and pulled strongly in a sawing position by two persons; one of whom holds the bottle firmly in his left hand. Heated in a few minutes by the friction of the string, and then dipped suddenly into cold water, the bottle will be decapitated more easily than by any other means. Let the phial be now nearly filled with common pump water, and, applying the finger to its mouth, turn it quickly upside down; on removing the finger it will be

found that only a few drops will escape. Without cork or stopper of any kind, the water will be retained within the bottle by the pressure of the external air; the weight of air without the phial being so much greater than that of the small quantity within. Now let a bit of tape be tied around the middle of the bottle to which the two ends of a string may be attached, so as to form a loop to hang on a nail; let it be thus suspended, in a perpendicular manner, with the mouth downwards; and this is the barometer. When the weather is fair, and inclined to be so, the water will be level with the section of the neck, or rather elevated above it, and forming a concave surface. When disposed to be wet, a drop will appear at the mouth, which will enlarge till it falls, and then another drop while the humidity of the atmosphere continues.

To Bleach Prints and Printed Matter.

Simple immersion in oxygenated muriatic acid, letting the article remain in it, a longer or shorter space of time, according to the strength of the liquor, will be sufficient to whiten an engraving; if it be required to whiten the paper of a bound book, as it is necessary that all the leaves should be moistened by the acid, care must be taken to open the book well, and to make the boards rest on the edge of the vessel, in such a manner that the paper alone shall be dipped in the liquid; the leaves must be separated from each other, in order that they may be equally moistened on both sides. The liquor assumes a yellow tint, and the paper becomes white in the same proportion; at the end of two or three hours, the book may be taken from the acid liquor, and plunged into pure water with the same care and precaution as recommended in regard to the acid liquor, that the water may touch both sides of each leaf. The water must be renewed every hour, to extract the acid remaining in the paper, and to dissipate the disagreeable smell.

To Remove Ink Spots.

Ink spots on paper can be easily and safely removed by applying a mixture of equal parts of oxalic and

citric acid in the form of powder. The spots are sprinkled with this, and the powder moistened by means of a piece of white paper that has been rolled and dipped in water. For this purpose a small brush or a piece of wool may also be used. After the ink has disappeared the spot is wiped off with a moist sponge and dried with blotting paper.

Luminous Labels.

Phosphorous, half-drachm ; oil cinnamon, half ounce ; mix in vial, cork tightly, heat it slowly until mixed. Labels written with this ink can only be read in a dark room, when the writing will have the appearance of fire.

To Make Silver Nitrate.

Dissolve a clean coin in moderately strong nitric acid, and evaporate to dryness in a porcelain dish, when a blue residue containing the nitrates of silver and copper is obtained. The dish is now moderately heated until the residue becomes uniformly black, the copper nitrate having been converted to the black oxide. Test a small sample with ammonia, which will give a blue colour, if any copper nitrate remains. Treat with hot water, filter to remove copper oxide, and evaporate to crystallisation.

To Make Dead-black.

Get a pennyworth of lampblack and a small quantity of Canada balsam, put a drop or two of the latter on a piece of glass, and add as much lampblack as the balsam will take up, mix thoroughly with the blade of a knife, adding the black by degrees till the whole forms a pretty dry ball. Put the ball into a saucer, and gradually thin down with turpentine to the consistency required.

To Mend Celluloid Articles.

To mend celluloid articles, wet the edge with acetic acid and press the pieces together for a short time.

A Useful Writing Ink.

Old Eikonogen developer is said to make a fairly serviceable ink in ordinary writing.

Common Names of Chemicals.

The following list of common and chemical names of substances may be of assistance to some of our readers. aqua fortis is nitric acid. Blue vitriol is sulphate of copper. Cream of tartar is bitartrate potassium. Calomel is chloride of mercury. Chalk is carbonate of calcium. Salt of tartar is carbonate of potash. Caustic potassa is hydrate potassium. Chloroform is chloride of formyle. Common salt is chloride of sodium. Copperas, or green vitriol is sulphate of iron. Corrosive sublimate is bichloride of mercury. Dry alum is sulphate aluminum and potassium. Epsom salts is sulphate of magnesia. Lime is oxide of calcium. Lunar caustic is nitrate of silver. Mosaic gold is bisulphide of tin. Muriate of lime is chloride of calcium. Nitre or salt-petre is nitrate of potash. Oil of vitriol is sulphuric acid. Potash is oxide of potassium. Rust of iron is oxide of iron. Sal ammoniac is muriate of ammonia. Slacked lime is hydrate of calcium. Soda is oxide of sodium. Spirits of hartshorn is ammonia. Spirits of salt is hydrochloride of muriatic acid. Stucco, or plaster of paris, is sulphate lime. Sugar of lead is acetate of lead. Verdigris is acetate of copper. Vermillion is sulphide of mercury. Vinegar is acetic acid diluted. Volatile alkali is ammonia. Water is oxide of hydrogen. White precipitate is ammoniated mercury. White vitriol is sulphate of zinc.



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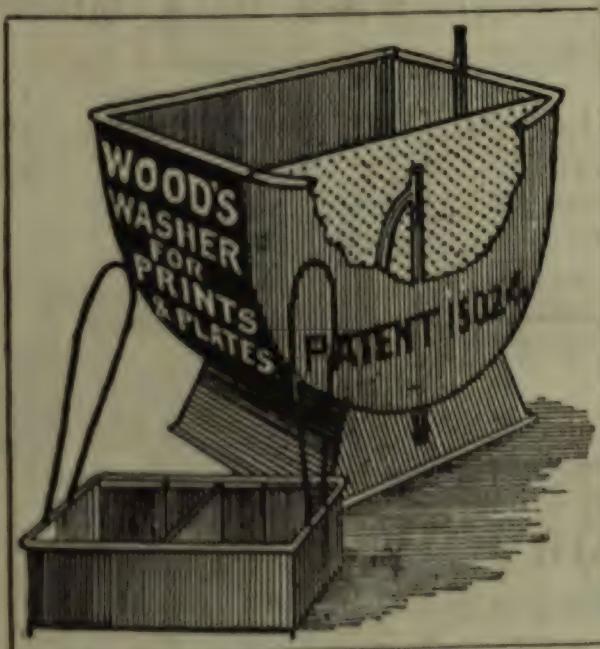
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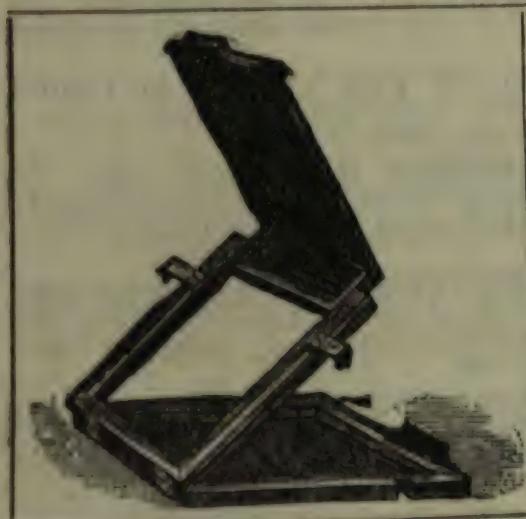
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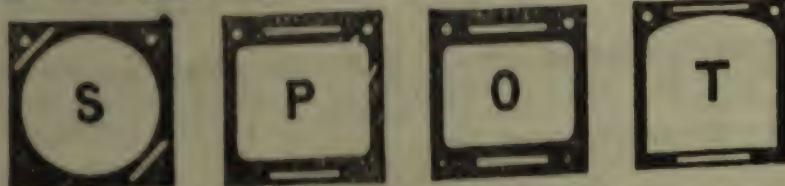
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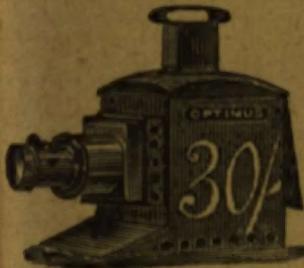
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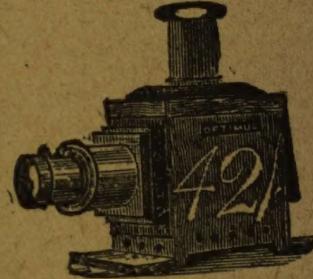
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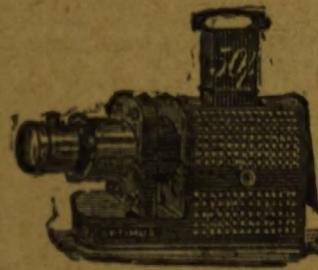
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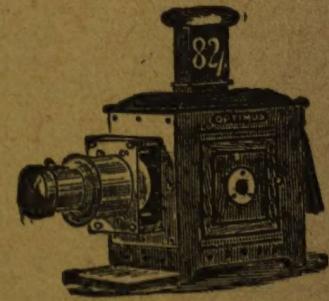
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